

The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Vol. XXIII, No. 26

CHICAGO

December 18, 1920

EDITORIAL DEPARTMENT—

Nathan C. Rockwood, Editor
Chas. A. Breskin, Assistant Editor

BUSINESS DEPARTMENT—

Geo. P. Miller, Manager.

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41st Street, New York City, N. Y.

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H. J. Wolfe, Manager. Circulation
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T. J. Sullivan, Vice-President.
Geo. P. Miller, Treasurer.
C. O. Nelson, Secretary.

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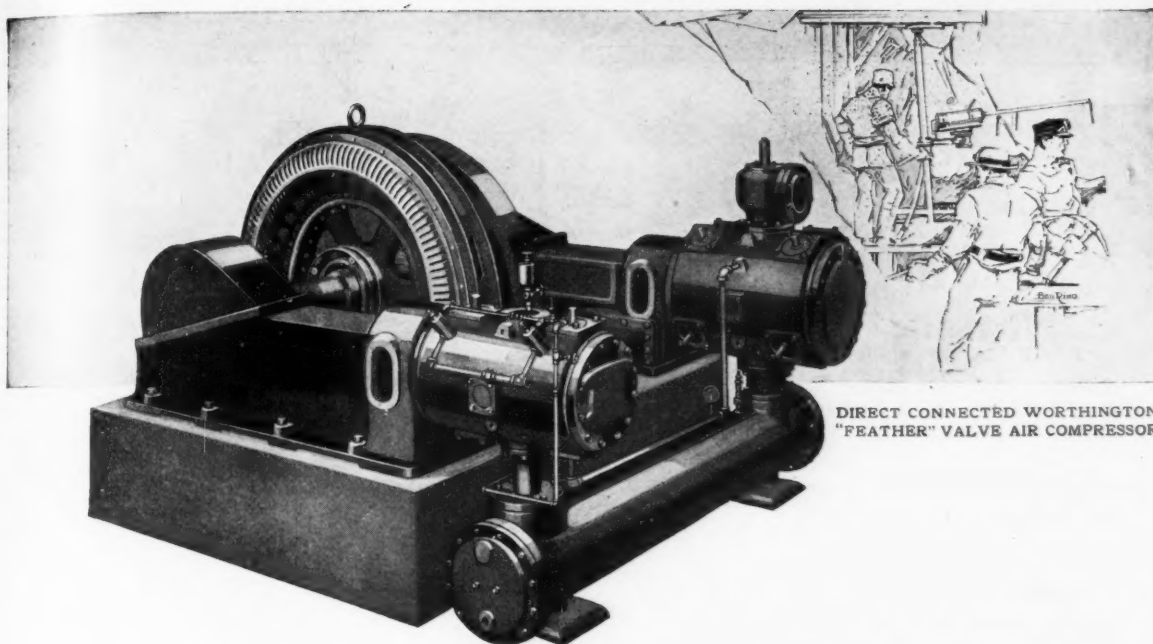
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DIRECT CONNECTED WORTHINGTON
"FEATHER" VALVE AIR COMPRESSOR

Worthington "FEATHER" Valve Air Compressors

(Reg. U. S. Pat. Off.)

WHENEVER steady, always ready compressed air service is needed—Worthington meets the call. And as the line pressure is dependent upon the compressor, so is the compressor dependent upon its valves for efficient service and performance.

Worthington Air Compressors have been standardized with "FEATHER" Valves—the simplest, lightest, most efficient valve ever developed for air compressor work.

Worthington "FEATHER" Valve Air Compressors, then, are the most highly developed apparatus for air compressor work, even as Worthington products are standard in their various fields.

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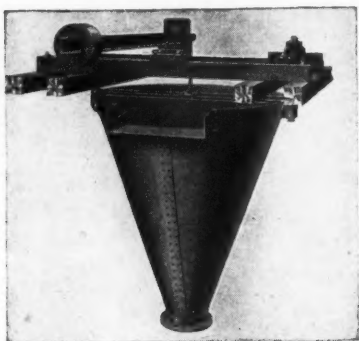
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LINK-BELT

Sand and Gravel Plants and Accessories

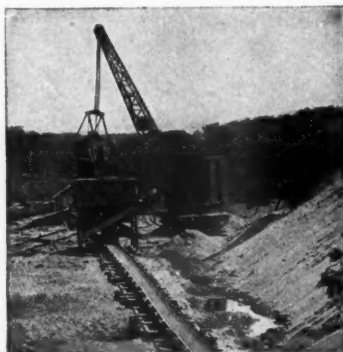


Complete sand and gravel washing plant. Dull Inclined Conical Screens and Drag Line Excavator Bucket in operation. Our catalog illustrates and describes some of the many plants we have designed. Send for a copy.



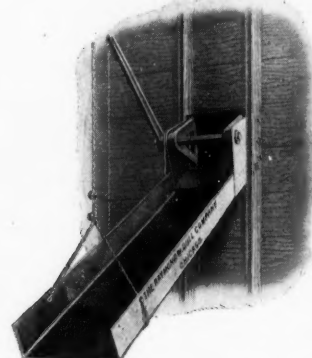
AUTOMATIC SAND SEPARATOR

We were the first to design a mechanically-acting separator and through successful improvements have developed a perfectly practical and thoroughly reliable machine.



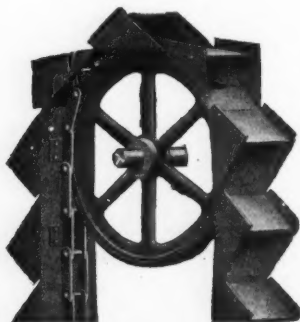
LOCOMOTIVE CRANE DELIVERING TO BELT CONVEYOR

The belt conveyor is fed by the standard Link-Belt crane shown equipped with grab-bucket used for excavating sand and gravel.



LOADING SPOUTS AND GATES

For loading out from the bins we provide segmental gates of types suited to the gravel and the sand, with spouts hinged for raising and lowering under control of counter-weights.



CONTINUOUS ELEVATOR BUCKETS

Our catalog No. 213-A fully illustrates and describes our many types of Elevators and Conveyors for Sand, Stone and Gravel.

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248-A



WAGON LOADER

Loads a ton of loose material—sand, stone, gravel, etc., a minute. Catalog No. 450.



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COLORS
EXPLOSIVES

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Out on the actual job—
that's where first-hand
practical advice on explo-
sives counts.

That's service.

Although you understand
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lems, there are times when
a little additional informa-
tion would be welcome.

Grasselli salesmen are
really service men. They
know explosives in your
field and their know-how
and experience is always
at your disposal.

*If you want service that's rendered and not
merely talked about, write us*

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Pittsburg Chicago Philadelphia
Uniontown, Pa. Pottsville, Pa.

ESTABLISHED
1939
GRASSELLI
EXPLOSIVES

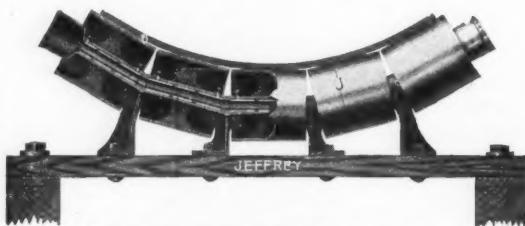
Wide Range of Service Along the Horizontal and Up Incline



Showing how the Jeffrey Belt Conveyor and Tripper automatically and uniformly fill large bins or storage space.



Handling Coke from Pit to Loading Tipple on a Jeffrey Belt Conveyor



Standard Five-Pulley Carrier

Pulleys are set in line upon hollow renewable steel spindles connecting four rigid and well-proportioned supporting stands, giving an exceedingly rigid construction, with the spindles serving as a continuous tube through which grease is supplied to all the pulleys by means of only two large grease cups to each carrier.

The Jeffrey Belt Conveyor

in many places is carried to great heights, and often has been applied in a way to take the place of two conveyers and an elevator by continuing an inclined conveyor over a storage bin.

The Jeffrey Five-Pulley Carrier

embodies all the high qualities of the Standard Three-Pulley Carrier, and permits of a closer conformity to the natural troughing effect of the belt, for the carrying of coal, sand, crushed stone, ore, rock, earth, etc.

Jeffrey Belt Conveyor Catalog No. 175-A

is a practical treatise that contains 80 pages of data on the latest and best in belt conveyor practice—it will enable the busy engineer to pick out the right conveyor to suit his requirements, in a few seconds. Send for a copy.

The Jeffrey Mfg. Company

935 North Fourth Street Columbus, Ohio

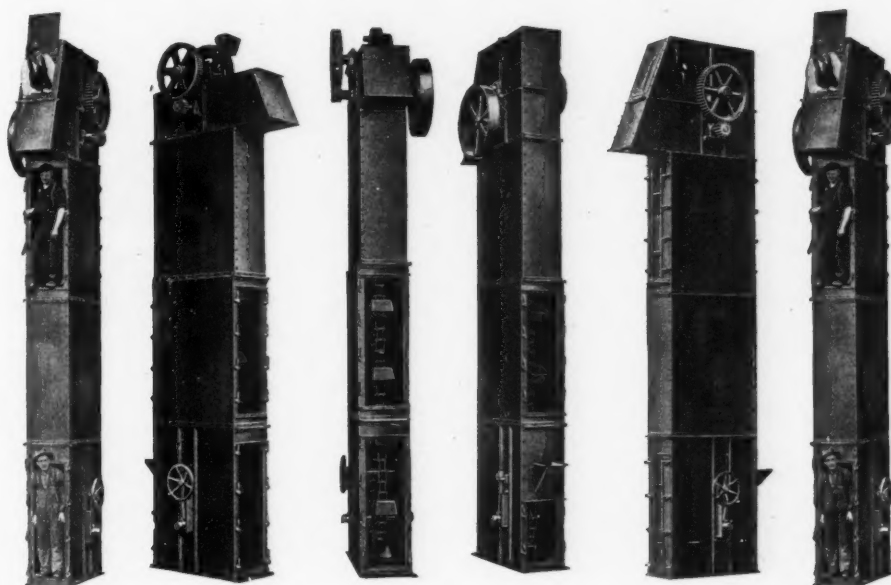
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STURTEVANT "ONE-MAN ONE-MINUTE" "OPEN-DOOR" MACHINERY

CRUSHERS, GRANULATORS, GRINDERS, PULVERIZERS,
SCREENS, MIXERS, ELEVATORS, CONVEYORS, CHUTES.



"OPEN-DOOR" STEEL ELEVATORS

All steel, accessible construction, so that

"ONE MAN IN ONE MINUTE"

can open any door, without the use of tools, and immediately get at all important parts.

Self-contained, everything complete, ready to set up when received. Big accessible discharge, with adjustable spill board. Split head, heavy gears and pinions, ample shafts, ball and socket bearings. Automatic Take-Ups for quick, accurate, fool-proof adjustment, self-aligning bearings.

For convenience, labor-saving, quick replacements and cleaning the Sturtevant "Open Door" one man Elevators are unequalled.

STURTEVANT MILL CO., BOSTON MASS.

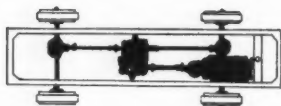
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DUPLEX TRUCKS

BUILT FOR BUSINESS



Duplex 4-Wheel Drive Truck Has 15 Inches Road Clearance



NOTE the remarkable simplicity of the Duplex 4-Wheel Drive chassis. It is by far simpler than most 2-Wheel Drive trucks of the same capacity. The Duplex will cut repair bills—cut operating costs, save gasoline, save tires and work every day.

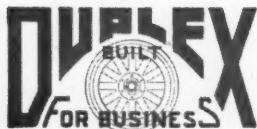
THE 15-inch road clearance of the Duplex 4-Wheel Drive enables it to traverse roads that stop most trucks—as the average clearance is only 10 inches. And because of the fact that every wheel is a driving wheel, this Duplex exerts three times the pulling power over any 2-Wheel Drive truck of the same engine capacity.

There is no inert weight to overcome—no resistance of powerless front wheels and so you get greater economy in gasoline—greater saving in tires and a far greater saving in wear and tear.

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It is 3½-ton capacity—price \$4250 f. o. b. Lansing, and for heavy hauling of any kind over roads that are good or bad, it is proving itself in a hundred lines of industry to be the most economical trucking unit ever designed.

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Duplex Truck Company
Lansing • Michigan

One of the Oldest and Most Successful Truck Companies in America



How the Eastern Limestones Prove the Metal of a Big Blast Hole Drill

IT IS a well recognized fact that the limestones of the Appalachian Belt and the New England states are the hardest and the toughest in the country. Furthermore, they are broken by many seams and faults.

Big blast hole drills operating in the crushed stone quarries of this section are put to a much more severe test than in the comparatively soft and thinly laminated rocks of the Middle West. Drilling speed is essential in order to minimize drilling costs, but is no more important than strength and endurance. A positive control over the drilling tools is absolutely necessary to forestall their tendency to drift off in the seams and crevices.

That the Number Fourteen Cyclone Blast Hole Drill embodies all these qualities is evidenced by the number of these outfits in use in Eastern limestone quar-

ries and the years of service and satisfaction that they have given.

The illustration above shows two Number Fourteen Electric Non-Traction Drills on the 30-foot ledge of the Hudson, N. Y., quarry of the Knickerbocker Portland Cement Co., where they have been in constant use for over six years. There are many more Cyclones in the famous Hudson quarrying district.

The hardest and largest users of big blast hole drills have Cyclone Drills in their pits and quarries. You can profit by their experience. Write for Blast Hole Data Sheet (Form 126).

We guarantee that our Number Fourteen Big Blast Hole Drill will drill more hole at less cost, all costs considered, than any other blast hole drill of the well driller type on the market. To demonstrate this we will place one of the outfits in your pit in competition against any or all other makes of blast hole drilling machines. If the Cyclone does not out-drill and out-wear all other makes, we will remove it from the work without cost to you.

THE SANDERSON-CYCLONE DRILL CO.
ORRVILLE, OHIO

Eastern and Export Office
 30 Church St., New York

When writing advertisers please mention ROCK PRODUCTS

BROWNING

The Reach Counts—

Here it means a car loaded to capacity

A CAR shortage demands the *full loading* of every available car. Here's where "Browning" efficiency comes in. Note the bucket—it's in position to load the extreme end of the car solidly, *even on a single track*. And that's only one point in the general all-around service rendered by Browning Locomotive Cranes.

Another big feature in the placing of the controls. These are so located that the operator has the work in full sight all the time, each and every control being handled by him without changing position. The separate rotating engine makes it possible

to hoist, rotate and travel, all at the same time—another big time-saving feature.

To watch a "Browning" at work is an impressive sight. While apparently as sturdy and unshakeable as the rock of Gibraltar, yet the rapidity of its movements are surprising. "A Giant's strength with a Wizard's deftness," has been aptly applied to the Browning Locomotive Crane.

A graphic view of the achievements of the Browning Locomotive Crane in all lines of industry is shown in the Browning Catalog. Your copy will be sent on request.

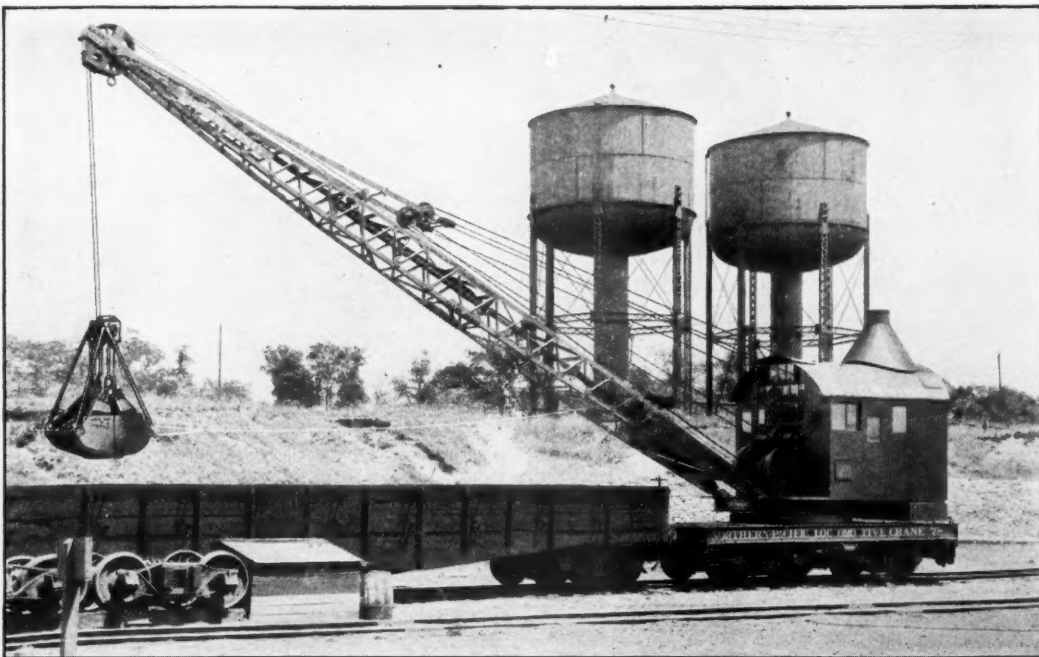
THE BROWNING COMPANY

CLEVELAND, OHIO, U. S. A.

SALES OFFICES:

New York Seattle Salt Lake City Birmingham Los Angeles
Chicago Portland Washington, D.C. Montreal San Francisco

LOCOMOTIVE CRANES



When writing advertisers please mention ROCK PRODUCTS

MORRIS PUMPS



Discharge of 20" Dredge 7 minutes 10 seconds after cutter had been stopped. Pipe being cleared of material. No solid material entering suction pipe.



Results of but one hour pumping with 20" Dredge. Note—Not a sign of mud or clay in sight.

THE application of Hydraulic Dredging for handling sand and gravel from deposit to plant is constantly increasing in favor with producers, as the volume of material is far in excess of that produced by any other method, and at a greatly reduced cost. Then there is the economical advantage of excavating and transportation in one operation, plus the saving in washing, as the material is thoroughly scoured while traveling through the pump and discharge pipe.

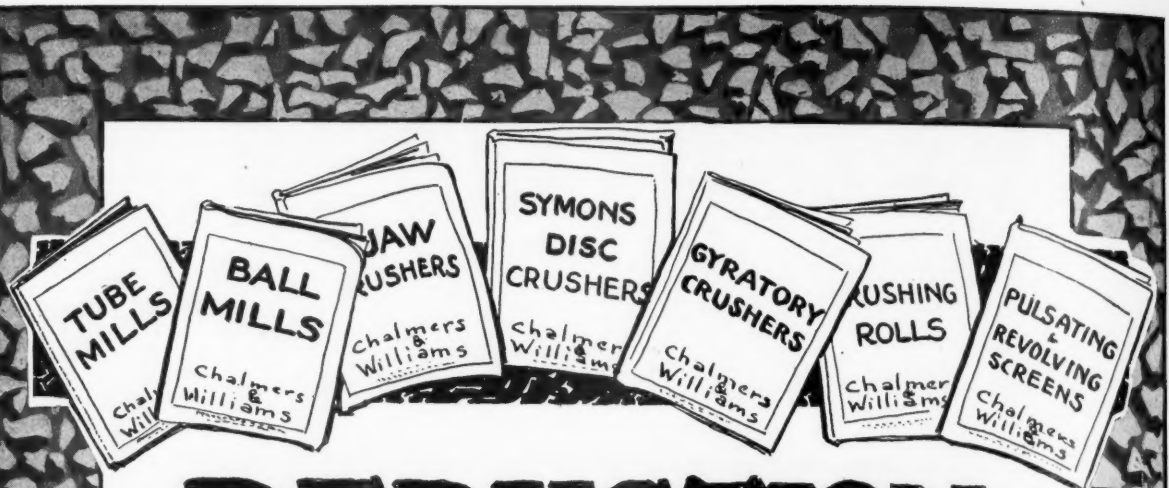
Since the Civil War Morris has been building pumps of all sizes and kinds, especially Dredging and Sand Pumps. Some producers prefer the heavy, unlined pumps of cast iron, carbon, or manganese steel, others the lined pump. Morris has patterns of either type in all sizes, even up to 48-inch discharge. Should you require a large dredge, Morris will figure on the complete outfit, as he builds engines up to and including a thousand horsepower.

Have you Bulletin 19-B?

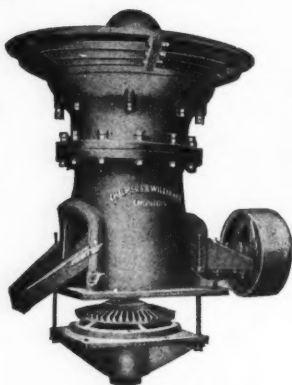
MORRIS MACHINE WORKS
BALDWINVILLE, N. Y.

REPRESENTATIVES IN PRINCIPAL CITIES

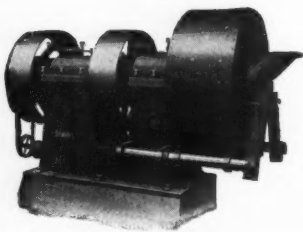
39-41 Cortland St., New York Real Estate Trust Bldg., Philadelphia Realty Bldg., Charlotte, N. C.



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GYRATORY
CRUSHER



SYMONS HORIZONTAL
DISC CRUSHER

Build now the
National State
and County
Roads that are
needed

U. S. DEPARTMENT
OF LABOR

W. B. WILSON, Secretary of Labor

Are you doing your part to
supply the necessary aggregate
for this work? Our Engineering
experience is at your disposal
and we solicit the opportunity
of quoting on your machinery
requirements.

Our Machinery
Now In Use In

Vermont
Connecticut
Massachusetts
New York
Pennsylvania

New Jersey
Maryland
Ohio
Indiana
Illinois

Michigan
Wisconsin
Rhode Island
Virginia
Kentucky

Tennessee
Alabama
Florida
Arkansas
Missouri

Iowa
Minnesota
North Dakota
South Dakota
Nebraska

Kansas
Oklahoma
Texas
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1425 ARNOLD STREET, CHICAGO HEIGHTS, ILLINOIS

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How Tough is a Leviathan Belt?

Here is a 30" x 8 ply Leviathan belt 300 feet long that has been carrying 700 tons of rough, jagged slag every day for over four years. The slag varies in size from tiny pieces up to chunks a foot and a half thick and travels up a 20° incline from railroad hoppers to crusher.

Of course this remarkable performance is partly due to the Style F Main Belting Rollers, but it shows what can be done when you get the right belt and the right rollers working in proper combination.

There are so many hundred instances where Leviathan and Anaconda have surpassed the best performances ever obtained with any other kind of belts, that regardless of your present opinions, you certainly should at least investigate our records, claims and guarantees.

We have prepared two really worth-while booklets on belting—"Transmission Belts" and "Conveyor Belts." May we not mail you one, or both?

For every 1% a belt stretches after the first cut, the Main Belting Company will refund 3% of the purchase price. The first cut is excepted merely because it is generally recognized that it is more a matter of taking up slack than taking out stretch.



MAIN BELTING COMPANY
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REVIEW AND FORECAST NUMBER

Published Annually

CHICAGO

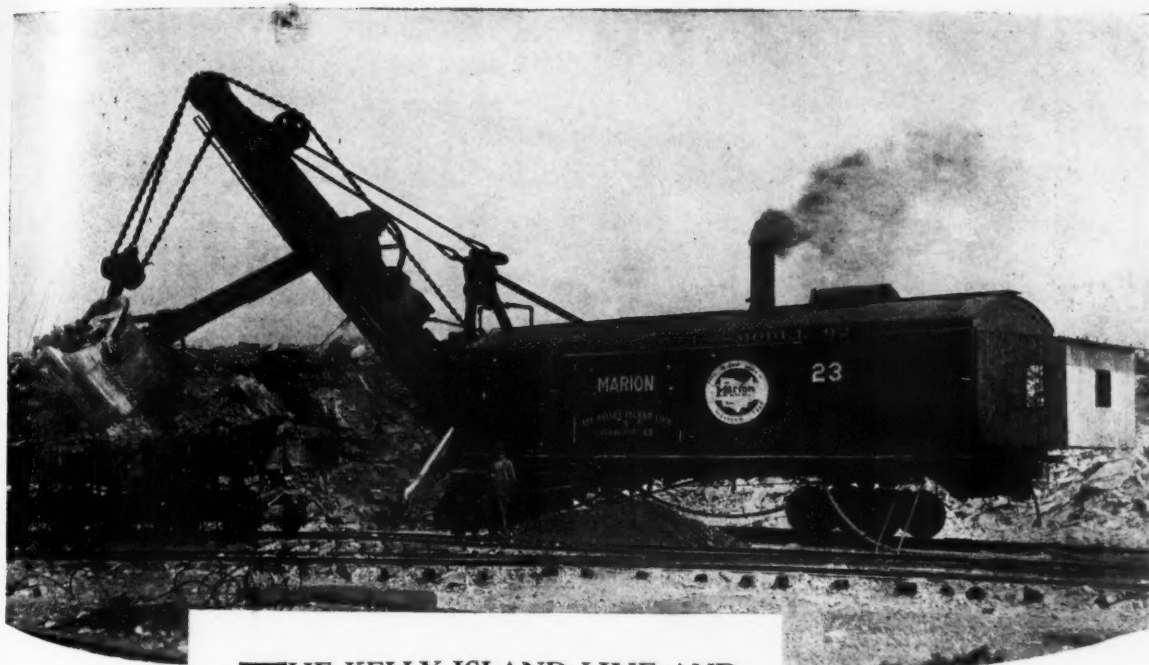
January 1, 1921

A REVIEW of the rock products industry for the past year is no little task. Its figures and facts and the estimates on production, a resume of prices, a review of the conditions that make for increases and decreases, the car shortage and so orth is the big job our editors have been working on for months and months for the big Review and Forecast Number of *Rock Products*.

The readers of *Rock Products* are giving their usual genuine co-operation in making this big number a success. It will be of vital interest and value to the entire industry. Because of the value of this big number to the entire industry, it makes possible an extra value to the manufacturers who carry their advertising in the big number.

The Review and Forecast Number is the January First Issue of Rock Products — the Authority and Business Journal of the Rock Products Industry. Forms Close December Twenty-seventh

When writing advertisers please mention ROCK PRODUCTS



THE KELLY ISLAND LIME AND TRANSPORT COMPANY, of Cleveland, operating quarries throughout Ohio and West Virginia, is one of the largest producers of limestone products in the country. "Marions" have been their approved choice for many years, twenty-three in all following the installation of their first shovel, a Model "G," in 1903.

The continued preference of this large organization for our products is typical of many others in the limestone industry. Owners and operators alike prefer "Marions" for they know that "Marion" *Quality and Service* can always be depended upon.

If you are needing a shovel for next season's work your order should be placed now to insure early spring delivery.

THE **Marion**
STEAM SHOVEL CO.

Established 1884

Marion, Ohio

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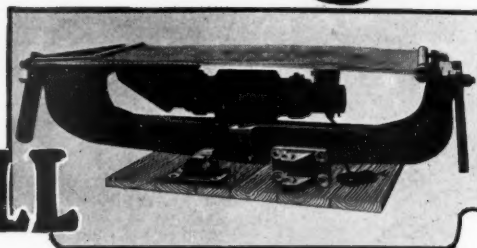
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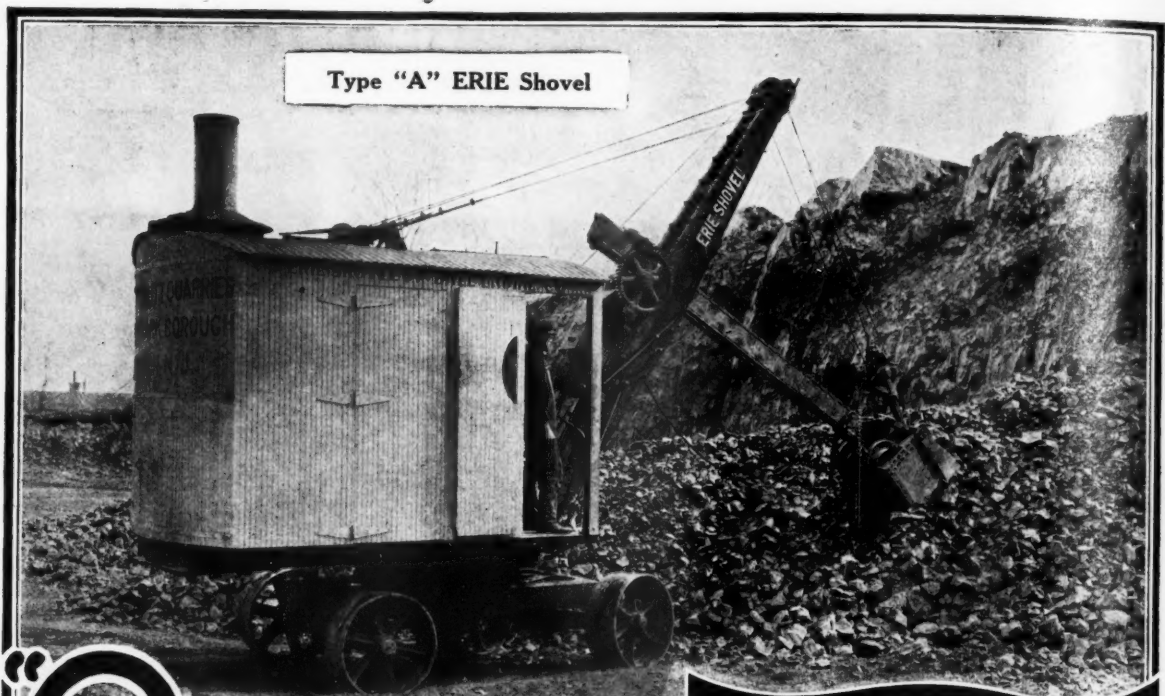
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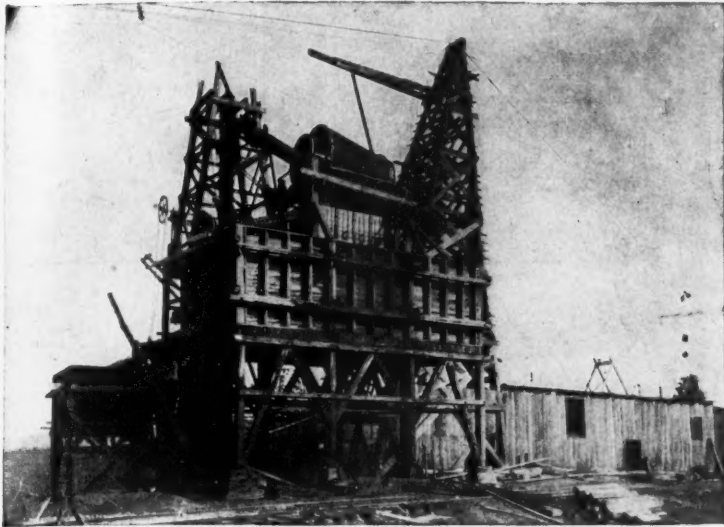
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Rock Products

Vol. XXIII

Chicago, December 18, 1920

No. 26

Modern Sand-Lime Brick Plant

Many Interesting Labor-Saving Devices in Plant of Crume Brick Company,
Dayton, Ohio

IT IS NOT VERY OFTEN that one has the pleasure of visiting a factory where every single workman displays real genuine interest in the operation, but it happened to be the good fortune of one of the editors to visit recently the plant of the Crume Brick Co. of Dayton, Ohio, and here he found that spirit. At this plant one sees no antiquated methods, but instead, thoroughly modern, and in many cases original, labor-saving methods for increasing quality and production.

Here one sees a reasonable, orderly movement of work by a minimum number of men, and the scrupulous care taken by R. C. Kiser, superintendent of the plant, to see that the finished product is up to standard. It is largely due to W.

H. Crumé, president of the company, who in connection with Mr. Kiser, developed the labor-saving devices, that the Crume Brick Co. has become what it is today. Mr. Crume is every inch the investigator and is untiring in his efforts to develop labor-saving devices as ap-

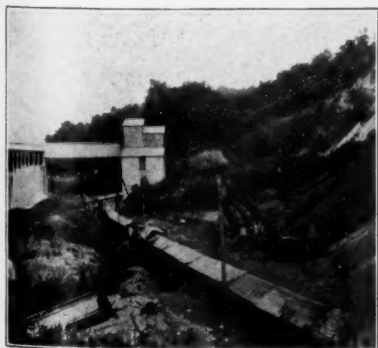
plied to the manufacture of sand-lime brick.

Sand Deposit and Method of Excavation

The sand deposit at the plant of the Crume Brick Co. is a glacial formation and quite a remarkable one, in that it is



Wagon loader and portable belt conveyor



Permanent belt conveyor to crusher



Digging wagon loader. Note character of sand deposit

uncommonly free from undesirable materials such as gravel, which is an objectionable feature in sand for sand-lime brick. A comparatively pure clean sand of this nature not only insures a safe and durable brick, but is essential to cheap manufacture. The deposit covers a total of 16 acres and is 150 ft. high at the deepest point, and it is estimated that the material extends to a depth of 60 ft. below the present working level.

To mine and handle this deposit of sand, the company uses a digging wagon loader, a section of portable belt conveyor and a semi-permanent belt conveyor from the sand pit to the crusher and rolls, as illustrated in the accompanying views. The wagon loader is of the disc-bucket type, electrically operated, and is self-propelling, forward and reverse. The 30-ft. belt conveyor which works in connection with the loader, is also electric-

ally driven and carries the sand to a 250-ft. electrically-driven belt conveyor, built in 12-ft. interchangeable sections, and covered with a roof of galvanized corrugated iron. Any section of the roof may be removed and a loading hopper substituted.

The conveyor now discharges at one end of the brick plant to a permanent 100-ft. belt conveyor, and this in turn feeds a 30-ft. bucket elevator, which discharges to a piano wire scalping screen. In its program of installation of labor-saving machinery, the company is now making an improvement here. The permanent belt conveyor which feeds the bucket elevator will be so elevated as to discharge direct to the piano wire screen, thus eliminating the bucket elevator.

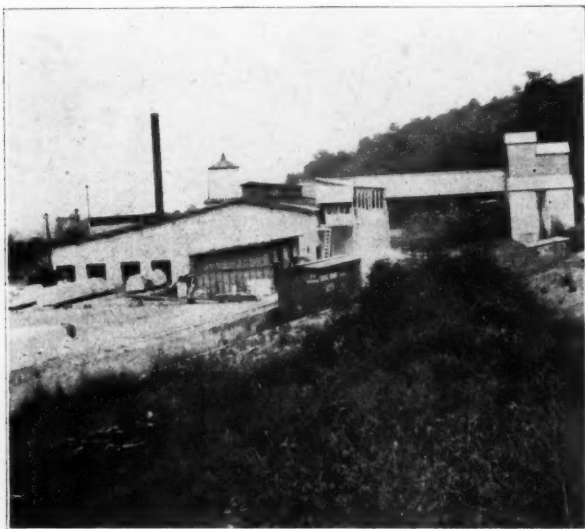
Storage Plan and Preparation of Sand

Underneath the screens there will be a

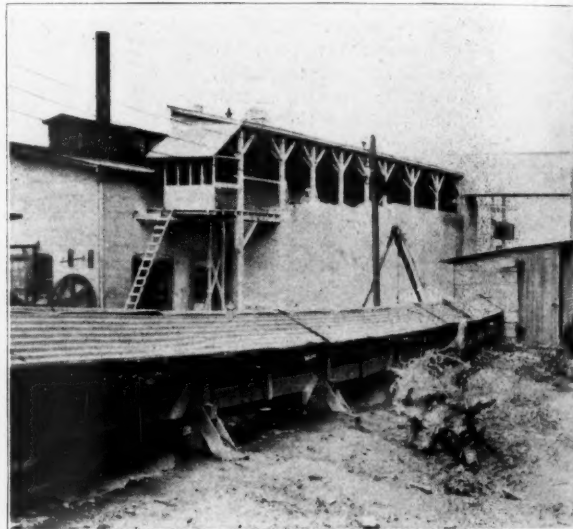
cross conveyor belt which will carry the screened sand to two steel storage bins of 60 yd. capacity each. Provisions will also be made for extensive ground storage. This plan will eliminate the necessity of shutting down in freezing or wet weather, when the sand cannot be mined. Rejections from the screen go to a (9x6-in.) jaw crusher and then to four sets of rolls, which reduce that little gravel that there is to sand. From the rolls the sand falls into a pit and is taken up by an 8x5-in. bucket elevator of 25 ft. centers and deposited in the cross belt conveyor.

Preparation of Lime

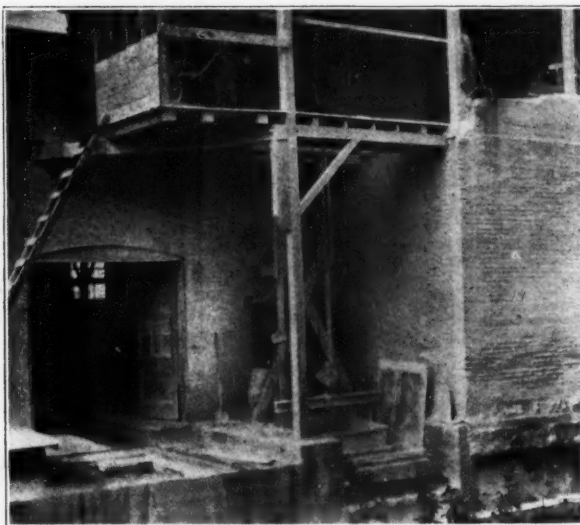
The lime that is used in making the brick is a high calcium lime and is bought in bulk and hydrated in a big tub holding $\frac{1}{2}$ ton of lime. The hydrating or slaking of the lime is a very simple process, con-



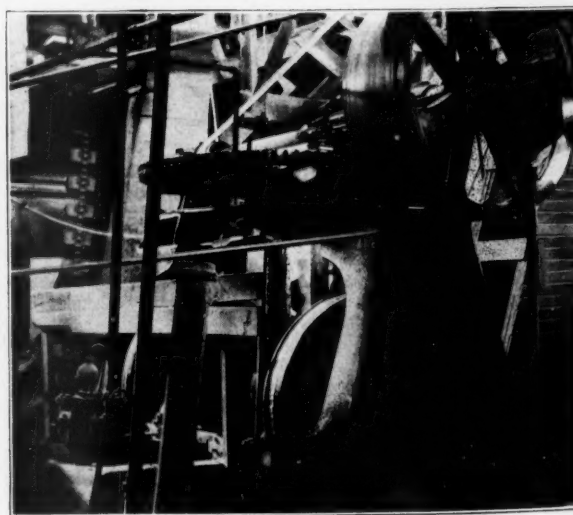
Plant of Crume Brick Co., Dayton, Ohio



Permanent belt conveyor. Roof of galvanized iron



Hydrating of lime in tub



Wet pan for mixing

sisting of the addition of water to the lime or calcium oxide, which enter into chemical combination. When the chemical action is over, the tub is elevated and dumped into a steel storage bin of 1-ton capacity. There are two such steel bins, which are as near air-proof as it is possible to make them. This system may seem crude, but it is said to be a cheap and efficient means of hydration for a plant of this kind. It is contemplated to do away with the tub now used by installing a screw conveyor, which will perform the double function of hydrating the lime and carrying it to the steel storage bins.

To prevent the necessity of shutting down for want of lime, a steel hopper storage bin for the quick lime will be installed, of 11 tons capacity. In this way the company will always have a sup-

ply of lime no matter what transportation conditions prevail.

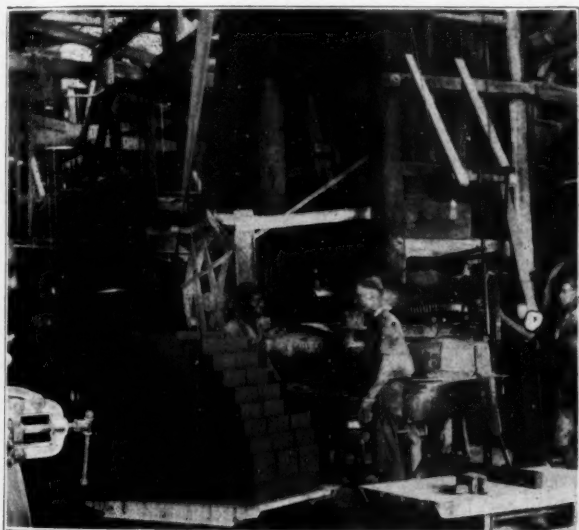
Grinding and Mixing of Material

At this stage the material is ready to be mixed for the presses. This was formerly done in wet pans similar to those used in clay brick manufacture, the hydrated lime and one-third of the sand being ground for two minutes, and then the remaining sand was added and the whole batch run two minutes or more and then the pan was emptied. Quite an important improvement has been made to this method. The steel bins holding both lime and sand are equipped with Schaffer poidometers (which are automatic conveying weighing machines) that correctly measure the proportions of raw materials. They are constantly in operation and discharge continuously

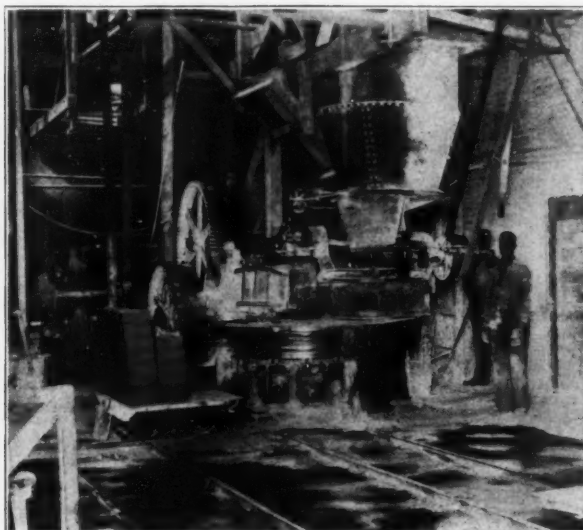
into a Marathon rod mill. This type of mill has never been used before in sand-lime brick manufacture, but because of recent tests made by the Crume Brick Co. and the results obtained, it would seem that this is a particularly efficient type of grinding and mixing apparatus for the manufacture of sand lime brick.

New Rod Mill

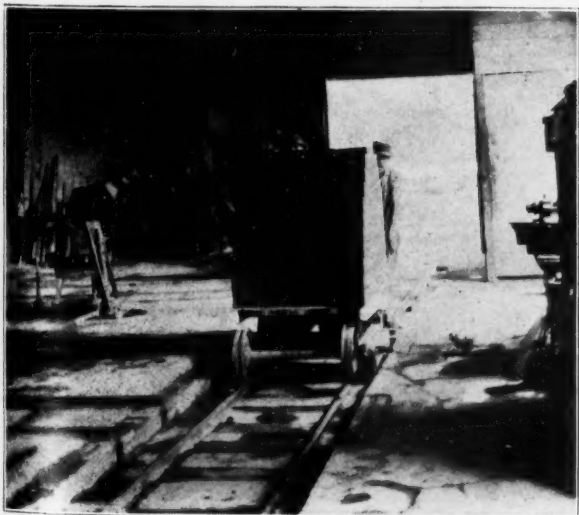
The principle of the rod mill is very simple. The crushing here is done on a line contact instead of on a point contact as in a ball mill. The mill is a cylinder and is filled with steel rods of varying diameters, these rods tumbling and revolving as the cylinder is turned. In this way the machine not only grinds the material, but thoroughly mixes it also. (The grinding is done wet, the



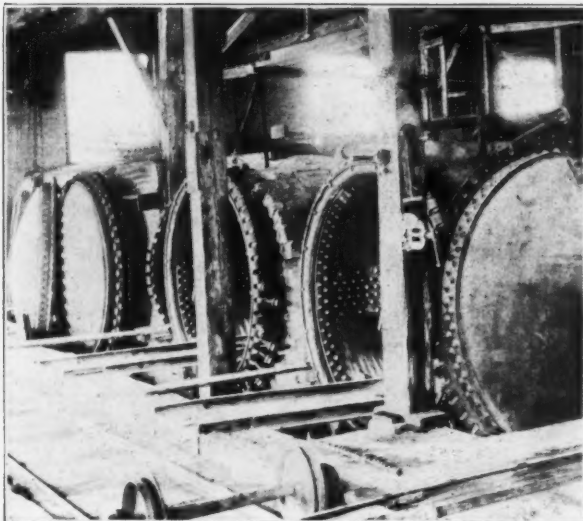
Transferring brick from rotary press



Rotary type brick press



Transferring bricks to hardening cylinders



Battery of hardening cylinders

poidometer measuring the water as well as the amount of sand and lime.)

Recent tests made by the company on this mill have proved it entirely satisfactory for the purpose. It was found that the mix is very thorough, the sand being evenly coated with lime and uniform throughout. The mill also reduces any undesirable gravel to sand. It was found on comparison with a brick made by the wet pan method, that the brick from the rod mill was equally as good as that of the wet pan, and also that the rod mill brick was entirely free from pebbles, while the wet-pan brick contained numerous ones. This mill does the work of two wet pans but requires only the power of one wet pan. In this way it decreases the power factor 50 per cent and allows very good control over the mix.

From the rod mill the material goes to a pug mill where water is added to the

mix. On account of the difference in moisture in the sand at various times, the mix has to be correctly tempered to the prevailing condition. This is accomplished by a man who has control of the water, which comes in at the top of the pug mill in the form of a spray. This man can regulate the spray of water to suit the condition of the sand. The water is pumped from a deep well by a steam pump using the exhaust steam from the hardening kettles, to a water tower with a capacity of 10,000 gal. An auxiliary water tower of 1,200 gal. capacity is also provided to furnish water for the boilers, hydrator, and mixer.

On leaving the pug mill the material falls into a pit and is taken up by an 8x5-in. bucket elevator of 35-ft. centers, and elevated on to a covered belt conveyor 18-in. wide and 50-ft. long, which discharges into a hopper feeding each

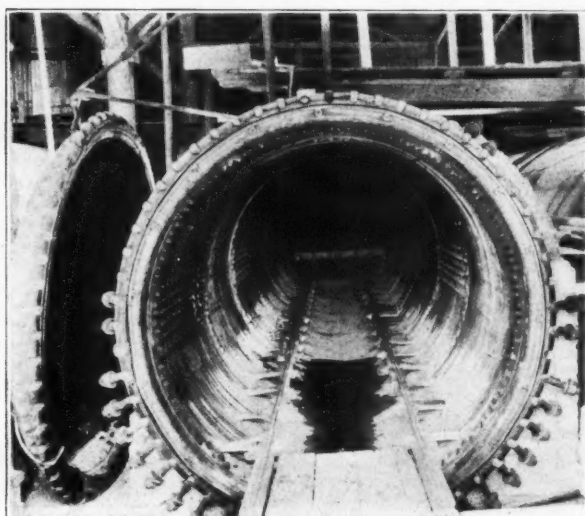
brick press. An automatic feeder is provided in the hopper and this lets the required amount of material into the press.

These presses, of which the company has two, are of the rotary type, having a rated capacity of 3,000 bricks per hour, and are manufactured by Jackson & Church of Saginaw, Mich.

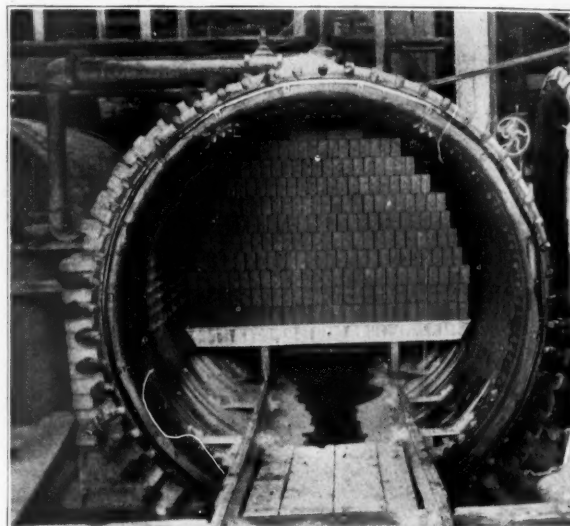
Hardening Cylinders

The bricks as they are taken from the press, are placed on flat-deck steel tram-cars, and by means of a turntable the car can be turned in any desired way. When 1,000 bricks have been placed on the car, it is transferred on to the main track as shown in one of the views and then again transferred into the hardening kettles.

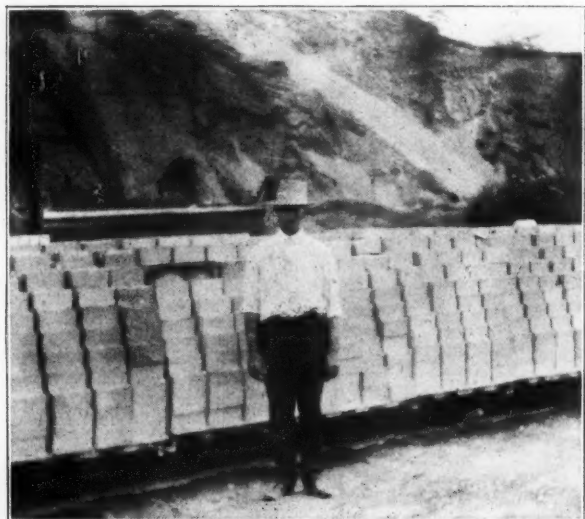
There are four hardening cylinders here and each cylinder holds 13 cars. When 13 cars of brick have been placed in the cylinder the head is bolted on and steam



Hardening cylinder with head ready to be placed in position



Car loaded with brick in hardening cylinder



R. C. Kiser, superintendent of plant



Loading bricks on to trucks

gradually admitted until it has reached a pressure of 120 lbs. per square inch. This pressure is maintained for from 6 to 8 hours, and then the steam is blown off.

Part of the steam goes to a steam pump, starting at a 125-lb. pressure and reducing to about 60 lbs., this consuming about an hour's time for each of the four cylinders, the remaining steam being blown off into the air.

About three-fourths of the steam used in the cylinders is condensed on coming in contact with the cold cylinder and brick, this condensation being trapped and run by gravity into a feed water heater and from there pumped to the boiler. The kettles are then opened and the cars transferred either direct to railroad cars or put in trucks. A piece of portable track is put in the railway box car and the tram car run right in, thereby saving any unnecessary handling. The company is now experimenting with a mechanical loader, which will take the entire load off the tram car, and put it in the railroad car without any handling at all.

The company has very little storage and thereby saves any intermediate handling. The bulk of the business done centers about Dayton, and therefore most of the brick are shipped in motor trucks. The hardening kettles or cylinders are 6 ft. in diameter, 42 ft. long and made of 3/4-in. quadruple riveted cast steel. They are insulated on the outside with a coating of sawdust, lime, and a layer of brick in the order named.

Only Sand-Lime Brick Plant in Ohio

The Crume Brick Co. is the only sand-lime brick manufacturer in Ohio and therefore has quite a demand for its product. The capacity of the plant now is 52,000 bricks per day, the bricks being pressed during the day, and the hardening in the cylinders is done during the night.

The boiler room is also in line with the other equipment of the plant. A 125-h.p. water-tube boiler furnishes all of the steam necessary, as steam is used only for cylinders and pumps; individual electric motors using outside purchased current are provided for the rest of the machinery. The boiler is also provided with an automatic stoker, thereby eliminating hand-firing. Each of the four hardening cylinders is equipped with recording steam-flow meters which tend to keep a check on the work of the fireman.

The company has adopted the standard specifications of sand-lime brick as set forth by the American Society of Testing Material, and is also a member of the Sand-Lime Brick Association, of which Mr. Crume is president, and Mr. Kiser, secretary.

L. V. Lytle is vice-president; R. A. Crume, treasurer, and Miss E. M. Kilian, secretary of the company.

As to Winter Operation

Let's Hear from Producers as to Practicability of Proposed Scheme

THE PRACTICABILITY of producing and shipping crushed stone, sand and gravel in freezing winter weather is seriously doubted by nearly every producer. Rock Products has heard express an opinion on the subject. Indeed some of the railways refuse altogether to accept sand and gravel during freezing weather unless the shipper will take all the responsibility for its being unloaded.

Notwithstanding these obvious objections to moving construction materials in winter, it has been argued that *this* is the time that the most open-top cars are idle and consequently it is a good time for contractors to stock up for the spring construction work. Proceeding on this argument the Lakewood Engineering Co., manufacturers of contractors' equipment, Cleveland, Ohio, has recently been sending letters to contractors, highway engineers, banks, chambers of commerce, railway officials, and others interested with the country's highway program.

Don't Look for Lower Prices

In defense of this suggestion the Lakewood company says: "There now seems no possible reason to look forward to lower prices for materials next year. Freight rates have increased, and a larger demand for material is expected. The demand is increasing in many localities faster than the supply. Freight rates and the law of supply and demand are the two principal factors governing price. Therefore, it does not seem that material prices will go down. Yet even if there were hope for a decline by next season, the extra cost to the contractor buying his materials for winter and spring storage will really be only a small insurance premium guaranteeing that he will not have to close down his work every few days to wait for materials. Such slight extra cost is mighty cheap insurance."

"The banks of the country are more than willing to help. A contractor needing financial assistance to aid him in shipping and storing materials early should not hesitate to go to his banker. Money loaned for this purpose is really backed by the security of the State for which the road is to be built. And what better security could be wanted?"

Unloading Problem?

"The difficulty of unloading sand or stone which has frozen in transit is an objection which is frequently raised to the shipment of road materials during the winter months. It is true that these materials may freeze in the cars, but material for road construction is shipped

generally only a comparatively short distance, and such freezing will be confined to a thin crust unless the cars are delayed in transit or unloading. The proper unloading equipment will make it possible to get the materials out of the cars in a minimum amount of time, which will prevent it from freezing solid.

"Where material is delayed, and becomes frozen in severe weather it, of course, will be necessary to employ steam pipes, or to apply heat in some other way to thaw it before it can be handled from the cars. But such procedure is far from impossible.

"In some of the Northern States where very severe weather prevails, it would, of course, be necessary to withhold shipments during extremely cold weather, because even though they are transported for only a short distance, they may become frozen solid in a very short time under such conditions. However, in such States where these conditions do prevail, it is possible to ship materials at all times except during the dead of winter.

All Year-Round Quarry Operation?

"Many quarries close down during the winter months—therefore, an argument has been made that materials will not be available for winter shipment. So far as we are able to learn, the quarries close down largely because of habit. There has been no active market for them during the winter months. They have preferred to stop their work instead of assuming the burden of stocking their materials until next season. If a market could be assured for the quarries which would absorb their output, there is no reason why they should not operate twelve months out of the year, with the exception of time required to make repairs."

Rock Products would be glad to receive and publish the opinions of its readers regarding the practicability of this proposal. Obviously their co-operation is essential to its success and if it really is an impracticable scheme the burden of its proof is certainly with them, because both themselves and all others in the construction game would be benefited by its adoption.

It is possible the real fundamental objection in some cases is the feeling that the construction industry is as much entitled to the use of the cars in the spring and summer as any other class of shippers. That is true, without a doubt, but that attitude does not show a spirit of co-operation that is necessary to solve the problem of *getting highways built*.

Application of Hydraulic Dredges in Sand and Gravel Production

An Ideal Method of Handling Material from Deposit to Plant When Conditions Make It Possible—Various Factors to Be Considered

THE APPLICATION of the pumping method for sand and gravel production is constantly finding greater favor, and the volume of material produced by this method easily exceeds the total of that produced by all other methods combined.

On account of the great diversity of conditions under which the different plants operate and because of the absence of big organizations with engineering staffs of their own, there is a great diversity of practice and frequently the inherent advantages of this method are ignored entirely and not taken advantage of.

Fig. 1 shows a perspective view of a plain suction type of hydraulic dredge, pumping from a river bottom directly onto the screens, where the material is graded and loaded on cars, while the waste water is returned to the river.

While this installation presupposes ideal conditions and is simplified to the utmost, there is, nevertheless, a large number of plants nearly identical with the illustration and producing material at remarkably low cost.

The great advantage of the pumping method over the others is that it combines the excavation and transportation

By Victor J. Milkowski
Engineer in Charge of Dredge Department, Morris Machine Works,
Baldwinsville, N. Y.

of the material in one operation at a very low cost. In addition, it is seldom that the material requires any scrubbing or washing as it is thoroughly agitated and scoured while traveling through the pump and discharge pipe with approximately six times its weight of water; and the impurities are carried off in the waste water.

Factors to Be Considered

The factors affecting the design and efficiency of the pumping plant or dredge which should be carefully studied and provided for may be stated as follows:

1. The character of the material; nature of the formation in which it occurs, size, hardness, weight, etc.
2. The desired capacity in cubic yards per hour.
3. The maximum depth below water surface from which it is desired to pump.
4. The maximum height above the water surface to which it will be necessary to deliver the material.

5. The maximum length of discharge line to be employed.

6. The kind of power to be used—steam, electric or internal combustion engine, and the method of drive, whether direct connected or belt driven.

7. The character of the water in which the dredge is to operate, velocity of current, depth, variations of depth and current, etc.

8. The probable duration of the work.

The most important of the foregoing and the most disastrous in consequences if determined incorrectly is the first item; that is, the determination of the character of the material. Naturally, nothing but sand and gravel deposits would be considered in connection with this; nevertheless, there is a great variety of conditions even within that narrow classification.

An ideal condition is that where the material is pumped from a river bed and is constantly being replaced with other suitable material brought down by the current. Such conditions prevail on many of our rivers, principally on the Ohio, Kaw and the Mississippi. The material in such cases is loose and can be picked up very readily with a plain suction without any cutter or agitator.

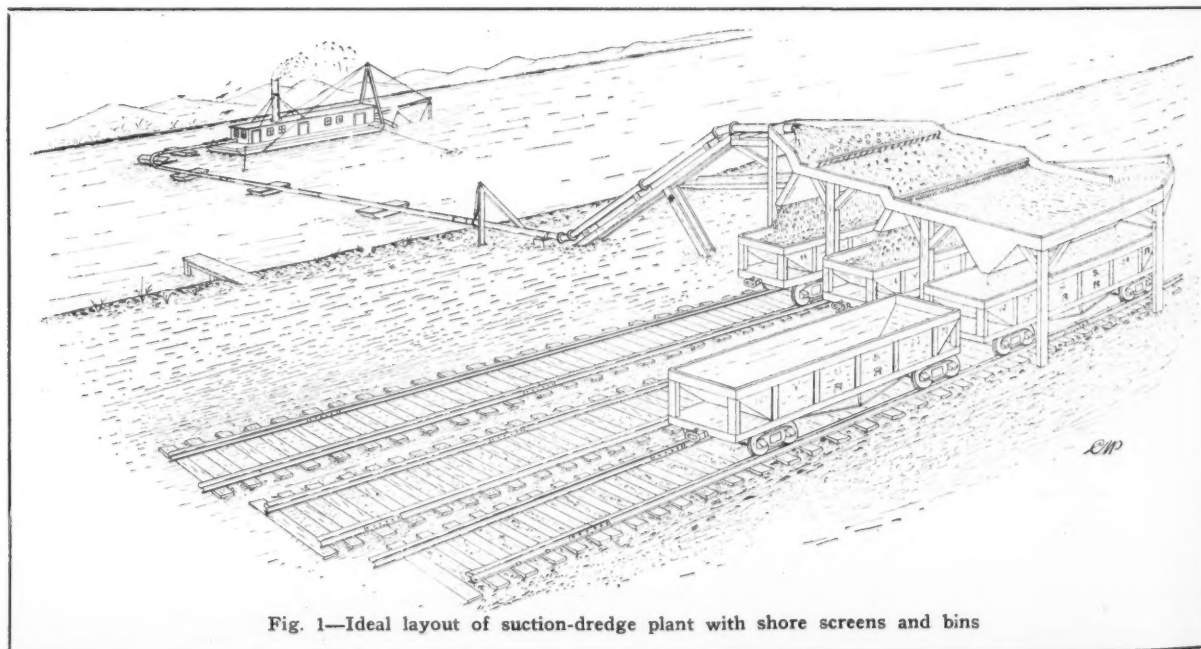


Fig. 1—Ideal layout of suction-dredge plant with shore screens and bins

A more complicated problem is met when the material occurs in a deposit or bank. The necessary conditions, of course, in such case for the employment of the dredge is a supply of water, required to form a pond or a pool in which the dredge can operate. This can be either ground or surface water, and the quantity of flow need not be large, as the waste water from the screening plant can be returned to the pool with but a very small loss. If the material in the bank is not cemented or packed very firmly it can be picked up with the plain suction as in the preceding case. A good test for this is whether or not the material will break up or disintegrate under the action of a stream of water under a moderate pressure.

If, however, the material is firmly packed or is mixed with stratas of clay, etc., the dredge should be equipped with a cutter on the suction. A dredge of this kind is suitable for all classes of material except solid rock, and should be used in preference to the plain suction type in all cases of doubt.

A short description of the two types of dredges and of their methods of operation are given at the end of this article. The sizes of the larger pieces of gravel and the amounts in which they occur should be carefully determined, for if an appreciable percentage of the material is too large to pass through the pump, numerous delays and troubles will result.

The size of the material, its hardness and sharpness determine also the amount of wear to which the pump will be subjected. Due consideration must be given to this in the design of the pump to secure the most economical operation.

The size and weight of the material further determine the velocity in the discharge line necessary to keep the material in suspension. This velocity is lower for fine, light material and higher for heavy coarse gravel. That in turn affects the power required, which is less with the lower velocity and with the same length and height of discharge pipe.

Capacity and Other Pump Details

The next point to be considered is the desired capacity of the pump in cubic yards per hour, which should preferably be in excess of that of the screening plant. The capacity of a dredging pump can only be arrived at approximately on account of the numerous factors which affect its output. For average practice, the amount of solids carried in suspension should be figured at about 10 per cent of the total by volume. The velocity of flow in the discharge pipe should be taken at 12 ft. per second, and the actual running time of the pump at from 60 per cent to 75 per cent of the total. Under these conditions the capacity of a 10-in. pump may be considered 700 cu. yds. per 10-hr. day;

and of a 12-in. pump 1000 cu. yds. per 10-hr. day.

It should be remembered in the choosing of pumps that the first cost, upkeep, power cost, supplies, labor, etc., are all lower proportionately with the larger size pump, and in addition, the larger size pump can pass larger diameter material. The sizes most common in sand and gravel plants are the 10-in. and the 12-in., which can pass solids about 7 in. and 9 in. in diameter, respectively.

The third point to be considered is the maximum depth below water surface from which it is proposed to pump. This, when not limited by other considerations, is limited by the amount of vacuum produced on the pump suction, which, if excessive, makes the operation of the pump very unsatisfactory. As the vacuum is also affected by the height of the pump above water surface and the friction in the suction line, these should be reduced to the minimum, both to keep down the vacuum and to permit of a greater depth. The practical limits of depth below water surface under average conditions may be considered 20 ft. for a 6-in. pump and 40 ft. for a 12-in. pump. An additional consideration against excessive depths is the difficulty in the handling of a long suction pipe.

Screening Plant

Considering next item No. 4, the maximum height above water surface at which it is desired to deliver the material; this should be determined by the necessary height of the screening plant and, of course, should be made the minimum practicable. A very common error that is made is to discharge the material into a hopper at the foot of the screening plant and then to elevate it to the top with a bucket elevator. While the delivery of both water and material to the top of the screening plant may be wasteful of power, it is, nevertheless, the most economical in the long run. The operation of elevating machinery in the presence of grit and water is bound to be unsatisfactory and extremely costly.

Fig. 2 illustrates a screening plant where the material was discharged 90 ft. above the water surface at point marked B. Fig. 3 shows the view of the dredge taken from the end of the discharge pipe. The pumps used in this case were two 12-in. pumps; one being placed on board, and the other being used as a booster pump, installed at A, Fig. 2.

The problem of disposing of the large volume of water from the screening plant should be carefully considered and provided for. With some types of screens, it may be necessary to dewater the material before feeding it to the screen.

The fifth point to be considered in the maximum length of discharge line through which it will be necessary to pump. This will be determined by the location of the

deposit with respect to the screening plant, and should be made the minimum possible, as it should be borne in mind that the friction losses in the discharge pipe are extremely heavy. The friction loss in 100 ft. of 6-in. pipe is equivalent to about 12 ft. static head, and in 100 ft. of 12-in. pipe to about 6 ft. static head. None but the long sweep fittings should be used in dredge piping.

While it is important to keep the elevation and the length of discharge line the minimum, as has been emphasized in the foregoing, this, however, should not be done at a sacrifice of other more important considerations. The elevation and the length of discharge pipe determine the total head against which the pump must operate, and which in turn determines the amount of power required. When the total head exceeds that allowable for one pump, which may be considered at about 130 ft., an additional pump or pumps are installed in line as boosters. By this means it is possible to design a pumping plant suitable for any elevation and length of discharge line.

Kind of Power for Operation

The sixth item to be considered is the kind of power to be used and the method of drive for the dredging pump. The principal consideration in the choice of power should be that of economy.

The greater number of small dredging plants are equipped with steam as it is the simplest and can be operated anywhere where fuel can be supplied to the dredge. A steam plant of that size, however, is possessed of all the disadvantages of a small plant operating intermittently and only during certain seasons. Owing to difficulty in getting coal for the dredge under conditions usually prevailing, steam power is bound to be costly. For the larger installations it will be found advisable to use condensing equipment.

The electric current offers the ideal power for this type of equipment and should be used wherever possible. The current can be conveyed on board by means of overhead wires carried on a pontoon line, or by a submarine cable. High voltage should be preferably used to economize on the cable. The whole installation can be made very simple and reliable and the most economical on account of low cost of labor and upkeep.

The internal combustion engine, especially the oil engine of the semi-diesel type is finding favor for this type of installation and should be investigated wherever electric power cannot be obtained. The high fuel economy and the present day reliability of oil engines, should offset the disadvantages of their high first cost and their great weight and bulk.

The choice in the method of drive for the dredging pump is made from consid-

eration of the possible machinery layout and the relative speed of the pump and driver.

On account of the steady character of its load the dredging pump is suitable both for direct connection and for belt or rope drive. A direct connected unit usually permits of a better machinery layout and better economy of space, both of which are of considerable importance on a floating equipment. On the other hand, a direct connected pump is limited in its speed by the speed of the driver. When the speed of the driver is low as with a steam engine or oil engine, the pump must be designed with a very large diameter impeller to develop the required head. This makes the pump very heavy and costly, and the wearing parts more difficult to renew.

With electric power, the speed of the motor can be made to suit the speed required by the pump. In that case, there-



Fig. 2—Screening plant with dredge discharge 90 ft. high

fore, there would be no advantage whatsoever in the use of a belt drive.

Where considerable variations are expected in the elevation and the length of discharge pipe, provision should be made to vary the speed of the pump, as a dredging pump has a tendency to overload the driver if running at too high a speed for the total head against which it is operating.

Other Operating Considerations

The character of the water in which the dredge is to operate, the depth, current, variations, etc., as specified under item seven, are instrumental in determining the size and type of the hull to be used; and the lines required for handling the dredge. For working in rapid current the hull should be designed with a rake at the bow and the stern, and the matter of drift wood and trash catching in the lines and against the hull should be carefully considered.

Where steam is to be used, the suitability of the water for use in boilers is of extreme importance and should be fully investigated.

The eighth item; that is, the probable duration of the work has a bearing on the degree of permanency to be sought in the construction and design of the plant.

The foregoing items cover quite completely all the considerations effecting the design of the dredging equipment proper, and they should be carefully studied and investigated before arriving at a final decision.

To help in understanding the various points mentioned, it may be advisable to give a short description of the two types of dredges referred to; that is, plain suction type and the cutter suction type, together with their methods of operation.

Two Types of Suction Dredge

The plain suction type of dredge consists of the dredging pump, the hoist for the handling of the suction and for maneuvering the dredge, a small auxiliary pump for supplying water to bearings, for priming and for general purposes, and of the necessary power units.

The hoist commonly used is with one, three or five drums; the most common being with the single drum. With a single drum hoist, the line is used for raising and lowering the suction; and a winch head is provided on the end of the shaft for use in the handling of the dredge. With a three-drum hoist, the two additional lines are used for the swinging line, while with a five-drum hoist, two lines are used for swinging lines and two for stern lines.

Fig. 4 illustrates a 12-in. electric-driven dredge of the plain suction type with a three-drum hoist. The dredging pump is directly connected to a 250-h.p. 514 r.p.m. motor. The hoist motor is 10 h.p.; and the service pump is a 2-in. centrifugal pump directly connected to a 7½-h.p. 1800 r.p.m. motor. The current is 3-phase, 60-cycle, 2300-volt, stepped down by means of transformers to 220-volts for the hoist and the service pump motors, and lights, while the large motor uses 2300-volt current.

In operation with this type of dredge, the suction is dropped down close to the bottom and the water rushing into the suction pipe scours out the adjacent material and carries it into the pump. As the adjacent material becomes scoured out, it is necessary to lower the suction further and to keep following the material down. In this manner a hole or a crater is excavated in the bottom and, by making a line of such craters when working against a bank, a definite working face is established. The best results are obtained when working in a deep bank where the material can be undermined and caused to cave in, as the loose

broken-up material can be picked up more readily and in larger quantities than the compact material in the bank or on the bottom.

The cutter suction type of dredge consists of the dredging pump, cutter machinery, hoist, service pump and the necessary power units. The use of the cutter makes it necessary to have spuds or anchors at the stern to hold the dredge in the cut. This arrangement requires a five-drum hoist; one line being used for the ladder hoist, two lines for operating the spuds and two swinging or breast lines.

Fig. 5 illustrates a 16-in. electric driven dredge of the cutter type. The dredging pump is directly connected to a 750-h.p. 400 r.p.m. motor. The hoist motor is 25-h.p. and there are two 4-in. service pumps directly connected to 25-h.p. motors. In addition there is a 6-in. centri-



Fig. 3—View of dredge from top of discharge pipe on screening plant

fugal pump for operating a hydraulic giant, driven by a 75-h.p. motor. The cutter is driven by a 50-h.p. motor and is geared down to about 15 r.p.m. The current used is a 3-phase, 60-cycle, 2300-volt. A small transformer is used on board to step down the current to 220 volts for lights.

The entire operation of the dredge is controlled from the pilot house located forward. The current is conveyed on board by means of a submarine cable shown in the foreground. In operation with this type of dredge, the material is cut up by the cutter and carried into the suction with the water. The dredge is swung about one of the two spuds at the stern by means of lines from each side of the cutter ladder, the spud preventing the dredge from being pushed back by the action of the cutter.

The swinging lines feed the cutter into the material laterally and hold it in position. The depth is regulated by raising and lowering the cutter ladder.

Advance forward is made by "walking," that is, by swinging the dredge over to one side about one of the spuds, dropping the spud that is "up" and raising the spud that is "down" and then repeating the process to the opposite side.

In this manner a definite cut is made and the material is fed to the pump at a uniform rate.

There is a common fallacy on the part of many pump users that it is but a simple matter to install a cutter on the suction. The change from a plain suction type to a cutter suction type can seldom be made with any degree of success, unless provision for that has been made beforehand, as the use of a cutter absolutely requires a five-drum hoist, and spuds, and in addition the whole hull must be considerably larger and stronger than where a plain suction is used.

The cost of a dredge equipped with a cutter is from 60% to 75% higher than if equipped with a plain suction, both being of the same size.

The scope of the foregoing discussion is limited to the different factors affecting but a single process in the production of sand and gravel; namely: the excavation, and transportation of the material to the screening plant. This, while no doubt the most important link in the whole chain, should only be considered in conjunction with the problem as a whole, the different parts of which were so ably treated in a recent series of articles in *Rock Products* by F. M. Welch.

Road Stone From Abroad

THE REPORT of the unloading at Orange, Texas, of a ballast cargo of rock for use on Texas roads, shipped from a Brazilian port, suggests that under present conditions a regular importation of this unusual commodity may be established, at least for a time.

The Texas Gulf region, similarly to the rest of the country, is engaged in an extensive campaign of road building. No suitable local road material is found near the coast and the new increased freight rates on the railroads has made the cost of material from the distant interior road rock quarries so great that cheaply produced suitable road rock from abroad, brought as ballast, or to supply a lacking return cargo to these gulf ports, may compete with domestic products in some instances. It is possible too that ships from Europe, engaged in the seasonal gulf ports traffic, may find it profitable to bring road rock to these ports part of the time, especially during the continuation of the period of the great demand for road material to complete the present contracts and to establish the



Fig. 4—Electric suction dredge with 12-in. pump

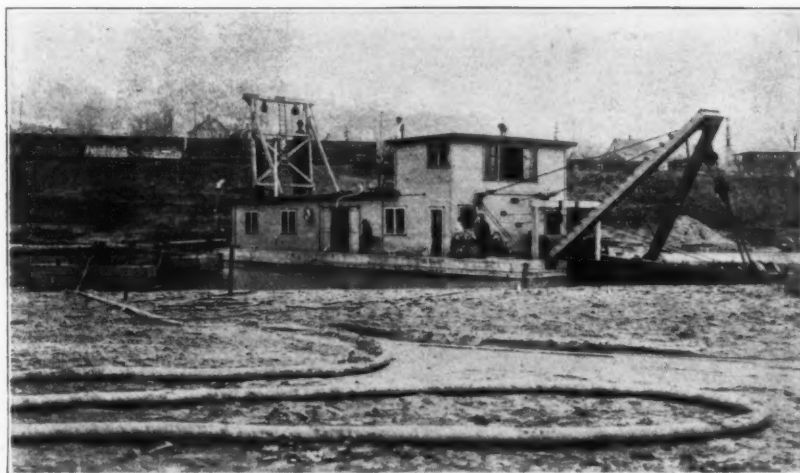


Fig. 5—Electric suction dredge with cutter intake and 16-in. pump

necessary road facilities to meet present day demands in a rich agricultural region, in which the surface and soil conditions are such that rock roads are a supreme necessity to permit of auto and truck haulage.

A regular business of importing road metal from Canada has existed for some time. Suitable and desirable trap rock from large quarries on the north shore of Lake Huron, owned and operated by American companies, have been supplying large quantities of rock by water shipment to the lower lake cities on the American side, which are deficient mostly in suitable local sources of supply for hard road surfacing material. This business is well established and is based on the favorable water transportation conditions available for the business.

There is no tariff on the importation of rock.

In the Texas localities, the practical absence of local supplies of material for the manufacture of cement, practically precludes the use of this material as a

substitute for rock for the roads, if rock can be obtained at any reasonable cost.

For this reason and because the gulf ports do not ordinarily have a local demand for the usual heavy materials suitable for ballast, such as iron ore, gypsum and magnesite, which come to Atlantic ports at times, it is probable that continued importations of rock may be made from South America and perhaps from Europe.—Kirby Thomas, Consulting Engineer, New York City.

English Cement Manufacturers Seek Market in Texas

INQUIRIES concerning the standard of cement needed in Texas have been received by authorities of the University of Texas bureau of economic geology and technology from a cement firm at Ellesmere Port, England, which proposes to ship its product to Texas if it will meet requirements. The cement, university authorities said, probably would come to Galveston as ballast.



Hints and Helps for Superintendents

New Application of Small Compressed Air Drills

THE VIEW BELOW shows the quarry of the Wharton Steel Co., Wharton, N. J., after a recent blast. According to the "Compressed Air Magazine" all the drilling for this blast was accomplished with hand hammer drills.

The quarry face is about 20 ft. deep and the powerful type of hand hammer compressed-air drill used is claimed to operate at this depth satisfactorily and to be capable of drilling 250 ft. of hole per day.

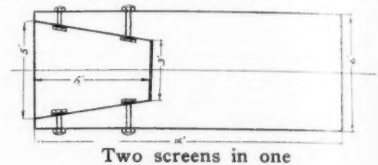
The holes were drilled on from 5 to

6-ft. centers, which gives a good distribution of the explosive, and, it is claimed, results in the rock being broken up into smaller chunks, requiring less plug drilling or mud capping. It is also claimed that the new method scatters the stone less and makes it possible to get closer to the face with the loading track, but view herewith does not seem to prove this.

For loading at this quarry a caterpillar mounted shovel is used. The same shovel is used for stripping. The ease with which this shovel can be moved anywhere has made it possible to use it in a number of instances as a locomotive crane in moving heavy pieces of equipment.

Reclaiming Screen Rejections Device

A PROFITABLE DEVICE to install in a plant where trouble is found in reclaiming rejections (oversize) from



screens, and where there is lack of headroom, is the device pictured above.

It consists of an ordinary rotary cylindrical screen, with a conical screen at-



Blast from holes made with hand hammer compressed-air drills

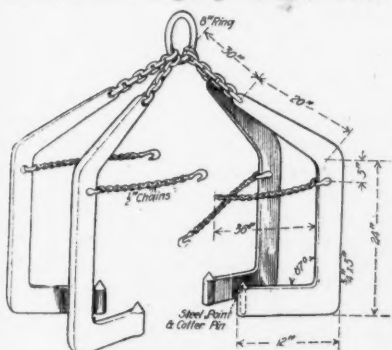
tached to the feed end, inside the cylindrical screen. The small end of the conical screen is fitted with a blank plate so as to retain the material inside. As every quarry has its own determined size of rejections, the perforations in the inner conical screen would be determined by this. The whole device is governed by the tonnage the screen would take. For instance, a screen of the size as pictured below would have a capacity of 50 tons per hour with 15% rejections from the conical screen.

The conical screen inclination can be determined so as to discharge at the large end to a chute feeding the crusher. It can be fastened to the rotary screen by means of the rods or some similar device.

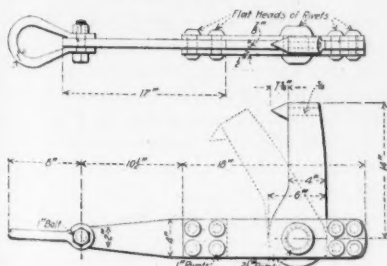
In effect it is of course a scalping screen within the sizing screen. It prevents overloading the sizing screen with material too large to pass.

Four-Point Grab for Handling Large Rocks at Crusher

EIGHT-TON ROCKS have been handled by a four-point grab, which has been found superior to tongs, at the pits of the Cornwall Ore Bank Co., Cornwall, Pa. As described by H. H. Hunner, in a recent issue of the Engineering and Mining Journal, this grab is easy to make, convenient for two men to handle, and is quickly attached to irregular chunks lying at random in a pile. Four times out of five it will release itself when the chunk is deposited on the stockpile. The material for the legs is $\frac{3}{4} \times 3$ in., but Mr. Hunner recommends using $\frac{7}{8} \times 3$ in., or 1 x 3 in., when the apparatus is designed to handle chunks weighing more than seven



Grab hooks for rock



Details of hook

tons, as hooks of the size shown in the figure have in practice required to be straightened out once or twice. The lower chains, three of which have hooks on the end, are pulled up snug and cross-tied after the legs are worked under the chunk at points convenient to get at. On round chunks, three legs are usually sufficient to make a lift, but in moving long slabs the four points are necessary.

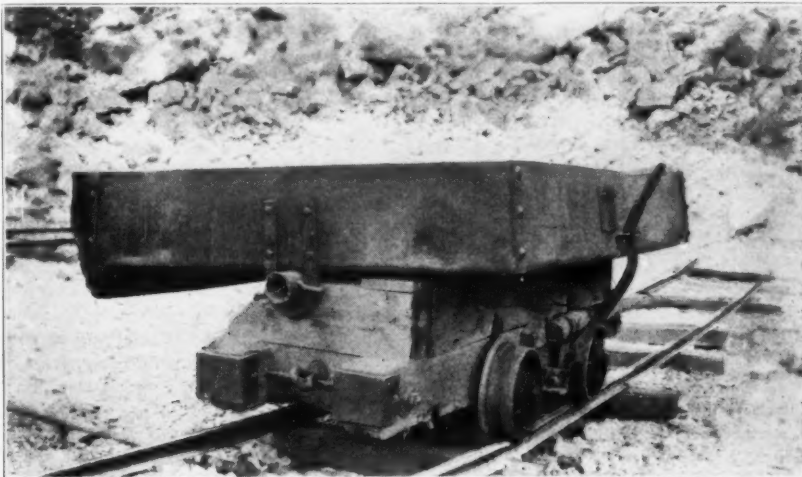
Home-Made Quarry Car

"THE BEST LITTLE QUARRY CAR ever built" is the term G. C. Buquo, superintendent of the G. C. Buquo Lime Co., uses to describe the car illustrated in the accompanying illustrations. This company operates an agricultural limestone grinding plant at Hot Springs, N. C. (described in Rock Products, October 9, 1920).

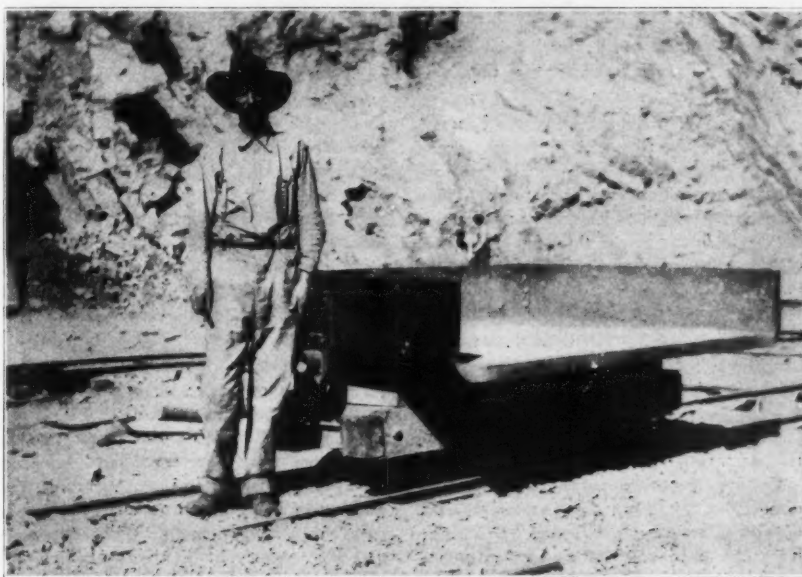
This car dumps one way only, and the body is so hung that it dumps its load automatically. It is designed for a hand loading quarry and one of its features is its light weight. The body is of thin plate steel (about $\frac{1}{4}$ or $\frac{3}{8}$ -in. stock) and it rotates on a horizontal axis made of wrought-iron or steel pipe.

The body is held horizontal by a pin catch on the side, as shown in one of the views. A quick jerk of the lever releases the pin and the car dumps by having its axis off center. The pole projecting horizontally, shown in one of the views is a foot brake. The car holds about 2 tons.

Apparently one of its chief virtues is the simplicity of design and construction. Mr. Buquo says it is the cheapest type to build and that one car of this type has already given 8 years' service and is still good. For hand loading it is particularly well designed because it is low.



Self-dumping quarry car for hand loading



Relative size of car and motive power

Burning Limestone for Both Lime and Carbonic Acid Gas

IV—Design and Operation of Pot Kiln Using Coke Fuel

THIS, the concluding article in the series, begun in the November 6, 1920, issue of Rock Products, is largely made up of calculations involved in studying or investigating the efficiency of a pot lime kiln burning coke fuel. These are refinements that the average lime burner seldom makes, but which he must eventually come to if he would have an efficient operation based on well-known principles of fuel economy.

A lime kiln may be divided into a number of zones which upon close observation will be found to be quite plainly defined.

1. The heating zone includes the upper portion of the kiln down to the point where the fuel starts to burn. It is here that the cold stone is heated by the hot gases passing through, and this results in saving some of the heat in the gas.

2. The burning zone is located in the central portion of the kiln and includes practically the entire portion where the fuel is burning. In this zone the temperature should be somewhat above that of the dissociation of calcium carbonate, but is generally much higher in practice.

3. The cooling zone is the remaining lower portion of the kiln and includes only the area occupied by burned lime, through which the air for combustion of the fuel must pass, serving the double purpose of cooling the lime, and preheating the air.

4. Sometimes authors also speak of an equalizing zone, that portion of the kiln above the limestone and surrounding the charge pipe. This space serves the same purpose as the air chamber on a pump.

In designing a lime kiln, if the capacity required and the time of burning are agreed upon, the size of the zones required to perform the functions assigned to each may be easily calculated. The proportion which each zone bears to the total cubic contents of the kiln will have a marked influence upon the heat economy of the operation as well as upon the actual burning of the limestone, and also upon the gas pump and gas washers.

The time of burning will depend upon several things, viz., the nature of the limestone, the size of the pieces used and the temperature of burning.

Calcium carbonate may be completely dissociated at temperatures as low as 800° C., with a certain size of pieces, and a certain time of exposure, but if the time be shortened or the size of the pieces of limestone be increased, then the temperature

must be increased in order to burn an equal amount of lime in the same time. As a rule temperatures around 1300° C. and even higher prevail.

The temperature to which limestone is exposed in burning has another important bearing upon results. As it is practically impossible to obtain limestone free from such impurities as silica, iron and alumina, exposure to high temperatures will result in the chemical combination of some or all of these impurities with calcium oxide, rendering such calcium oxide inactive chemically, and therefore valueless in sugar manufacture. From certain evidence at hand as a result of some investigations on this subject, it is believed that, as a rule, more than 10 per cent of the lime produced in our kilns is thus rendered worthless.

The presence of potash and soda in the limestone and in the ash of the coke, and the presence of these and the other substances, mentioned above, in the refractory lining of the kiln, is also harmful for the same reasons, but the effect of less importance on account of the relatively smaller amount of impurities from these sources.

For the control of the operation of lime kilns, a good system of simple records should be devised and used faithfully. The amounts of limestone and coke charged, and of lime drawn, should be shown, preferably by a system of tallying or a black-board, which should be in plain sight.

The installation of a recording thermometer, the bulb of which shall be so placed as to show the temperature of the gas immediately upon leaving the kiln, is very essential to a good control of operation. The shape of the curve and ranges of temperature, as shown by the chart of this thermometer, will, with some little experience, enable the operator to judge, with remarkable accuracy, just what has taken place during any 24 hours of operation, and will also indicate the position and cyclic movements of the burning zone and the relative intensity of the fire in the burning zone.

Further a recording draft gauge placed at the top of the kiln, to show the actual kiln draft, and a similar one at the suction of the pump will be found helpful, and a recording thermometer at the suction of the pump, will be necessary in order to supply data for calculations. As there is a considerable variation in the speed of the ordinary gas pump, a revolution counter should be used to determine the average

speed.

It has been mentioned elsewhere that the amount of CO₂ gas from a coke fired kiln is in excess of the amount actually required for carbonation purposes. Theoretically, with a perfect absorption of CO₂ from the gases, the CO₂ from the limestone alone would be sufficient for the purpose. However, as the gas distributors are more or less crude and the absorption is usually only from 50 to 75 per cent, more than the CO₂ from the limestone is required for carbonation.

While ordinarily, with gas pumps of sufficient capacity, this condition is entirely satisfactory, cases have frequently arisen where there was an object in increasing the absorption efficiency of the gas in the carbonation, on account of lack of pump capacity, which would then permit the use of a fan to draw off a certain portion of the gas and waste it to the atmosphere. This can be done to the extent that the efficiency of absorption is increased, so that an additional amount of lime in excess of the capacity of the pump can be produced by the aid of the fan.

The function of the gas washer is to remove dust, tar and other impurities from the gas and at the same time cool it to a temperature suitable to the circumstances. This is ordinarily done by subjecting the gas to the action of sprays of water in an apparatus of the general type of a spray condenser, the water from this flowing away through a barometric seal. Often this gas washer is so constructed and used as to require the gas to rise through a considerable column of water, which results in an increased vacuum, and increased volume of the gases to be pumped per ton of lime produced. This is not essential to the washing of the gas, and causes a reduction of kiln capacity which is sometimes not desirable.

As the gas pump is the measure of the lime burning capacity of the kiln, it is essential that the pistons and cylinders should be in perfect mechanical condition, so that each revolution actually measures a definite volume of gas, which multiplied by the revolutions of the pump, and taking into consideration temperature and pressure, is an absolute measure of the volume of gas pumped.

A close attention to these details and the calculation of results by the plans outlined above frequently reveal that the gas is leaking past the pistons to some extent,

which introduces an element of uncertainty into the calculations. It has in some instances been found possible to correct this condition by substituting hydraulic cloth packing for the piston rings of the pump, and, if the temperature of the gas is kept as low as it should be, there will be no trouble from the burning out of this piston packing.

It is in some cases found profitable to purchase lime from outside, where the capacity of the kilns is not equal to the requirements. This amount is determined by the amount of CO_2 gas which is available over and above the amount required for carbonation, taking into consideration the efficiency or possible increase in absorption efficiency of the gas distributors.

This may be determined by a calculation, an example of which is here given.

Assume the following conditions:

96% CaCO_3 in the limestone)

8.0% carbon on rock)

From Fig. 1 find $P = 88.8$

Temperature of gas as pumped 30°)

$T = 1.110$

Pressure of gas = 740 mm of mercury)

$V = 1.246$

$PTV = 1.228$

Pump 90 R. P. M.

Gas 39.0% CO_2

From the above a calculation indicates that the tons of limestone burned should be:

$$R = \frac{M \times G}{31 \times PTV} \text{ or } R = \frac{90 \times 39}{31 \times 1.228} = 92.8 \text{ tons limestone.}$$

For simplicity say 92 tons.

$92 \times .96 = 88.32$ tons CaCO_3 from limestone.

$88.32 \times .44 = 38.86$ tons CO_2 from limestone.

$92 \times .08 = 7.36$ tons carbon

$7.36 \times 3.666 = 26.93$ tons CO_2 from carbon

38.86 plus $26.93 = 65.79$ total tons CO_2 per 24 hours.

$65.79 \times .70 = 46.06$ tons utilized in carbonation with an absorption efficiency of 70%.

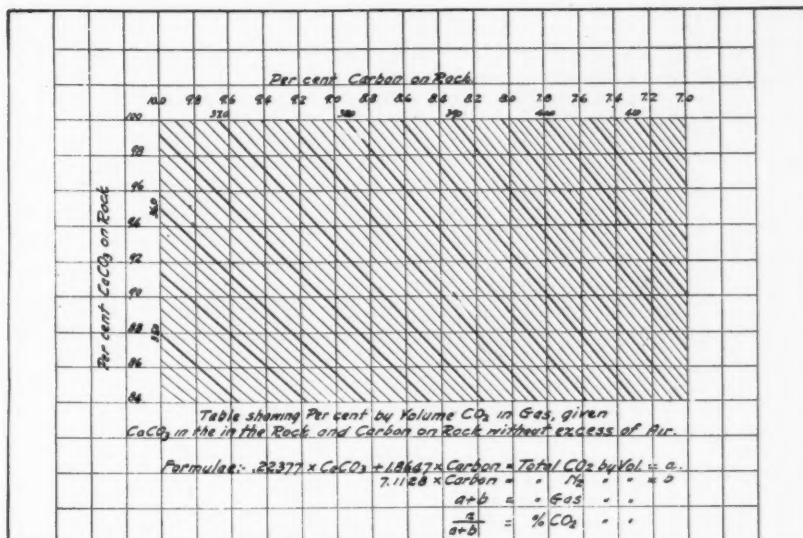
$46.06/.44 = 104.7$ tons of CaCO_3 which it will be possible to precipitate with that amount of gas at 70% absorption efficiency.

$104.7/.96 = 109$ tons of limestone of 96% CaCO_3 .

$109 - 92 = 17$ tons limestone which may be burned by the use of fans, or the equivalent amount of lime which may be purchased from outside, and carbonated with the gas available.

The following calculation of the heat balance of a lime kiln will be found useful as a guide:

1. Heat lost in escaping gasses without excess of air.



For 100 tons of limestone at 96% CaCO_3 and 9% of coke at 84% carbon, there will be, according to Fig. 1: $86.8 \times 37,216.869$ cubic meters = 32,304.27 cubic meters, which is equal to 63,535.5 kilograms of CO_2 .

Under the above conditions the pure gas will be 40% CO_2 (see Fig. 2). Then: $32,304.27/.40 = 80,760.677$ cubic meters of total gas, which will contain $80,760.677 \times .60 = 48,456.406$ cubic meters of nitrogen.

$48,456.405 \times 1.2552 = 60,822.48$ kilograms nitrogen.

Specific heats used—

$\text{CO}_2 = 0.217$ $\text{N} = 0.244$

$\text{CaO} = 0.217$

The heat lost then will be:

$63,535.5 \times 0.217 \times 295.5 + 60,822.48 \times .244 \times 295.5 = 8,462,200.995$ calories.

Where the temperature of the escaping gas is.....315.5

The temperature of the atmosphere is 20

Difference295.5° C.
 $8,462,200.995$

$\frac{8080}{8,462,200.995} = 1,047.3$ kilograms carbon
 $= 2,308.87$ pounds of carbon
 $= 1.1544$ tons of carbon
 $= 1.1544/.84$ or 1.3740 tons coke.

2. Heat lost in hot lime drawn from kiln.

For 100 tons of limestone at 96% CaCO_3 , the temperature of the lime as drawn being 200°C ., and the temperature of the atmosphere being 20°C .,

The products of the burning operation are:

$96 \times .44 = 41.36$ parts CO_2
 $96 - 41.36 = 54.64$ parts CaO
 $100 - 96 = 4.0$ parts impurities.

$54.64 + 4 = 58.64$ parts drawn as lime

$.5864 \times 2000 = 1,172.8$ lbs. lime per ton limestone

$1,172.8/2.2046 = 531.978$ kilograms lime.

The heat lost then will be:

$100 \times 531.978 \times .217 \times 180 = 2,077,906.068$ calories.

$2,077,906.068/8080 = 257.978$ kilos of carbon.

$257.978 \times 2.2046 = 566.67$ pounds of carbon.

$= .28333$ tons of carbon

$.28333/.84 = .337$ tons of coke.

3. Heat lost in excess air in kiln gas.

All oxygen in gas represents five times that amount of air which has leaked in.

Assume that the gas analysis shows 2% of oxygen = 10% air,

Total cubic meters of gas without excess air is 80,760.677, $80,760.677/90 = 89,734.985$ cubic meters of total gas and air. Subtracting from this last amount the gas alone = 8,973.408 cubic meters of air.

$8,973.408 \times 1.294 = 11,611.50$ kilograms of air

$11,611.59 \times 0.237 \times 295.5 = 813,200.288$ calories

$813,200.288/8080 = 100.6436$ kilograms of carbon

$= 221.899$ pounds of carbon

$= .1109495$ tons of carbon

$= .13208$ tons of coke.

4. Heat generated from the coke.

Assume 9% coke on limestone, to have 84% carbon = 7.5% carbon on limestone.

$.075 \times 100 = 7.5$ tons carbon per 100 tons limestone.

$7.5 \times 2000 = 15,000$ pounds carbon

$15,000/2.2046 = 6,803.955$ kilograms carbon

$6,803.955 \times 8080 = 54,975,956.4$ calories.

5. Heat required to dissociate 100 tons of 96% limestone.

Assume 425 calories required to dissociate one kilogram of CaCO_3 .

$2000/2.2046 = 907.194$ kilos in a ton
 $907.194 \times 425 = 385,557.45$ calories per ton of CaCO_3

$385,557.45 \times 100 = 38,555,745$ calories per 100 tons of CaCO_3

$38,555,745 \times .96 = 37,013,515.2$ calories per 100 tons of limestone.

$37,013,515.2/8080 = 4,580.88$ kilograms of carbon.

$4,580.88 \times 2.2046 = 10,099.008$ pounds of carbon.

= 5,0199 tons of carbon

= 5.97 tons of coke per 100 tons of stone.

6. Lime kiln heat balance.

Heat values expressed in per cent on limestone, and per cent on coke.

	Pct. on Limestone	Pct. of Coke
For dissociation of CaCO_3	5.970	66.4
Lost in hot gas.....	1.374	15.3
Lost in hot lime.....	.337	3.7
Lost in excess air.....	.132	1.4
Radiation (by difference).....	1.187	13.2
Totals	9.000%	100.0%

By following the above illustration under

actually observed conditions, the operator may obtain a good analysis of the situation. In the present case it is seen that the losses in excess air up to 10 per cent are comparatively insignificant, also with pulling lime of 200°C . The principal savings to be made would be in reducing the temperature at which the gases leave the kiln, by having a larger amount of cold limestone for them to pass through, and by using some type of insulation on the kiln.

The foregoing, while by no means a complete exposition of the theoretical side of lime kiln operation, covers, however, all the main points which will be met in the sugar industry.

Missouri Producers Form Local Agstone Association

Meeting at St. Louis Results in Formation of Missouri Chapter of National Agricultural Limestone Association

UNDER THE AUSPICES of the National Agricultural Limestone Association about twenty men interested directly or indirectly in the production of agricultural limestone met in St. Louis, Mo., on December 8. As a result of this meeting the Missouri producers at once organized a Missouri branch of the National Association with Edward Heley of Cape Girardeau as president, and A. N. Spencer, of the Spencer Whitlow Co., Columbia, as secretary-treasurer.

Several Illinois producers were also present and it is probable that an organization of Illinois men will result in the near future. A meeting of these Illinois producers will probably be held in Chicago before the first of January.

A. N. Spencer acted as chairman of the meeting. C. R. Wagner, field representative, and A. P. Sandles, secretary, of the National Association, ably explained the purpose of the meeting, which was the need of intensive local promotional work that could best be accomplished only through local organizations. The plan was immediately endorsed by E. J. Krause, vice-president and general manager of the Columbia Quarries Co., St. Louis, Mo., F. C. Murphy, secretary of the Brownell Improvement Co., Chicago, and Edward Hely, Cape Girardeau, Mo.

Missouri's Need of Agstone

Prof. M. F. Miller, of the department of soils, Missouri Agricultural College, Columbia, Mo., said that two-thirds of the soil in Missouri was acid and that at least half of the soils of the state needed lime immediately.

Professor Miller gave a most interest-

ing address. He stated that Missouri State College could not take sides as to whether farmers should buy pulverized raw limestone or burned lime. He stated the college must take the farmers' viewpoint and put farmers' welfare first. When asked what percentages of raw limestone and burned limestone were used in Missouri, Prof. Miller replied that 90 to 95 per cent raw limestone and about 5 per cent of burned lime. He said the main question of the farmers was to get results as cheaply as possible. He stated the big task ahead was to supply farmers' needs with good quality limestone or lime. He urged Missouri producers to organize and assist the college, county agents and extension workers to carry the message to the farmers.

Professor Miller said experiments in Missouri showed that putting limestone in the soil gave as good results as putting it on the soil. Professor Miller stated that limestone and lime were not only soil correctives but actually plant food to many crops.

The Missouri Agricultural College now has a man who spends all his time promoting the use of agricultural limestone and lime by the farmers of the state. Demonstration plots are treated one year and follow-up meetings are held in the same locality the next year. Prof. Miller said he had never seen anything develop faster than the Missouri farmers' interest in limestone. The only trouble has been that the experiment station has actually been compelled to slow up its work because railway transportation difficulties made it impossible to fill the farmers' demands for the product.

Professor Miller thought the slump in the prices of agricultural products might have some temporary effect in slowing up the demand but that agricultural limestone would suffer far less from this cause than high priced fertilizers.

E. J. Krause was host to those present at a luncheon at the Hotel Statler, after which the meeting immediately got down to business, the Missouri group perfecting its organization then and there, while the Illinois group took preliminary steps along the same line.

Attendance

Those present were: M. F. Miller, professor of soils, Missouri State College of Agriculture, Columbia, Mo.; A. P. Sandles, secretary, National Agricultural Limestone Association, Columbus, Ohio; C. R. Wagner, field representative National Agricultural Limestone Association, Columbus, Ohio; A. N. Spencer, Spencer-Whitlow Co., Columbia, Mo.; W. N. Spencer, Independence; Edward Hely, Cape Girardeau; E. J. Krause, and Charles H. Tigges, Columbia Quarry Co., St. Louis; C. H. Moran, Carthage Crushed Limestone Co., Carthage; J. J. Helper, Weldon Springs Quarry Co., Weldon Springs; S. K. Stranka, Big Bend; W. L. Connell, Missouri Quarry Co., St. Louis; F. C. Murphy, Brownell Improvement Co., Chicago; W. C. Charles, Charles Stone Co., Marion, Ill.; R. S. Schneider, Williams Patent Pulverizer Co., St. Louis; Paul S. Knittel, American Pulverizer Co., St. Louis; J. S. Davidson, Jeffrey Manufacturing Co., St. Louis; Geo. F. Jordan, of the "Missouri Ruralist" and Nathan C. Rockwood, ROCK PRODUCTS, Chicago.

Practical Chemistry for Lime and Cement Manufacturers

XVIII—The Chemistry of Combustion in Furnaces and Kilns

COMBUSTION IS THE RAPID CHEMICAL COMBINATION of two substances one of which is usually said to burn and the other to support combustion. The two principal substances which burn are carbon and hydrogen or their compounds and the supporter of combustion is usually oxygen or what is the same thing, air. We can, however, have combustion without air as we can, for example, burn chlorine in an atmosphere of hydrogen and vice versa.

Combustion is usually attended with heat and light. Flame indicates the combustion of a liquid or a gas while solids simply glow when burned and do not give off flame. Many solids in burning, however, give off gases which cause flame. We all know how a charcoal fire simply glows while one made with gas coal burns with a flame. In the latter case, the fuel gives off a gas and in the former it does not.

Light is caused by incandescent particles. In the case of fuels these are usually particles of carbon.

Liquid fuels, such as oil, and gaseous ones, such as acetylene, which are rich in carbon and low in hydrogen burn with a luminous flame for this reason. A smoky flame contains particles of carbon which have not reached a temperature of incandescence. We can prove this by the accumulation of soot from such a flame. Soot is carbon. To make a flame non-luminous we must increase the air and burn up the carbon.

Most substances, before they will burn require that they shall be heated up to a certain temperature at which combination takes place, thus a fire has always to be kindled. A piece of wood surrounded by air will not burn but if the temperature of the wood is raised sufficiently high it burns or the chemical union between the carbon and hydrogen of the wood is broken down and these two elements combine with the oxygen of the air.

The temperature at which various substances burn varies with the substances and is called the "ignition temperature." It varies with different substances, phosphorus and sulphur, for example, ignite at much lower temperatures than does carbon.

When a substance burns new products are formed. These are ordinarily gases at the temperature of the flame. When carbon burns in an excess of air carbon dioxide is formed. If the air is deficient carbon monoxide is formed. Hydrogen always burns to water which, at the temperature

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of the flame is a gas, steam. If metals such as iron are burned in oxygen, however, the product of combustion is an oxide of the metal which is a solid. Since air contains chiefly nitrogen a large amount of this always accompanies the products of combustion.

Combustion of Coal

Let us study the combustion of some fuel. Coal, as we have seen, is composed chiefly of carbon and hydrogen. Good bituminous coal contains, say about 75% carbon, 5% hydrogen, 8% oxygen, nitrogen, sulphur, etc., 2% and about 10% ash. Some of the carbon, usually about 65%, is in the form of fixed carbon, and 10% is combined with the hydrogen and oxygen to form hydro-carbons. The combustible elements are carbon (whether present as free carbon or hydro-carbons) hydrogen and sulphur (which latter element unites with oxygen to form sulphur dioxide). The ash, of course, does not burn, neither does the oxygen or nitrogen.

When the coal is first placed on the fire, the hydro-carbons are driven off. These gases being composed of compounds of hydrogen and oxygen (and similar to illuminating gas) are burned above the fire in the combustion chamber. If we wish to completely burn these volatile gases enough oxygen must be admitted to the firebox to unite with them and the temperature of the combustion chamber must be sufficiently high to bring them to the ignition point. If for any reason these hydro-carbons do not burn we are allowing valuable fuel to pass up the stack unconsumed. When the hydro-carbon gases have passed off the solid carbon is left in the form of coke on the grate and this burns as the air passes up through the grate bars and comes in contact with it. If plenty of air is used carbon dioxide is formed but if the air supply is limited carbon monoxide is formed, in which case the coke is only half consumed and valuable fuel is again being passed up the stack.

A careful study of the chemistry of combustion will repay any manufacturer who is interested in the economic utilization of fuel and for this reason we propose to devote some space to the subject.

Air for Combustion

Most of us know by operation of automobiles, some by painful experience with a "balky" carburetor, the importance of a proper mixture of gasoline and air. This simply means that for best results there should be mixed with the gasoline just the correct amount of air for its combustion. Similarly coal should have mixed with it just the proper amount of air for its combustion for greatest economy. In practice, however, this is not easily obtained.

In the case of pulverized fuel, this can be burned with almost the exact quantity of air necessary for its combustion and I have seen cement kilns working with only 5 or 6 per cent excess air. This result is obtained because of the thoroughness with which the air and fine coal dust can be mixed when in the form of a cloud. Each particle of coal can be surrounded by the air necessary for combustion.

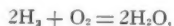
In the case of grate firing, however, this is not so simple. The coal does not always lie evenly on the grate, making a thicker bed of fuel in some parts than in others. The air naturally takes the path of least obstruction and pulls through the thin part faster than through the thick. The ashes also obstruct in some places to a greater extent than in others so that the air does not reach all the coal evenly and to burn all of the coal we must use a considerable excess of air. Most grate firing requires an excess of at least 50 per cent.

The amount of heat generated by the burning of the fuel is the same regardless of the amount of air employed to burn it. The losses are not due to lack of heat generated but to the heat carried off by the gases which escape from the furnace. If the temperature of the gases escaping from the furnace is the same, manifestly the greater the weight of these, the larger amount of heat will be carried off. Another source of loss is sometimes the temperature of the flame which is less with the increased volume. The temperature of flame is that to which the heat generated by the burning will heat the products of combustion and the excess air. As the heat generated is fixed it can, of course, heat the proper volume of products of combustion much hotter than it can if some of this heat must also be used to heat the excess air. In other words, if the products of combustion from 100 lbs. of coal are 1090 lbs., the temperature of the flame would be the temperature to which the heat

generated by the combustion of 100 lbs. of coal, or say 1,400,000 B.t.u., will raise 1090 lbs. of gases. Manifestly, this quantity of heat will raise 1090 lbs. of gas to a much higher temperature than it would the 1590 lbs. which would result if 50 per cent excess air was used.

Air Necessary for Combustion

It is often desired to calculate the theoretical quantity of air needed for the complete combustion of a fuel. Such, for example, as in determining the size fan needed to supply this air, etc. This calculation can be readily made if we know the composition of the fuel. In the case of volumes of gases it is very simple; since by Avogadro's law, equal volumes of all gases under the same conditions of temperature and pressure, contain the same number of molecules. Hence, if we know that hydrogen burns according to the reaction



we also know that 2 volumes of hydrogen unite with 1 volume of oxygen to form 2 volumes of steam. The composition of air is shown by the table given below to be 20.8 per cent oxygen; or 4.81 volumes of air are required to give one volume of oxygen, hence, two volumes of hydrogen will require for its combustion 4.808 volumes of air.

Methane would require oxygen according to the reaction:



or 2 volumes of oxygen for 1 volume of methane. Hence, $4.81 \times 2 = 9.62$ volumes of air for one volume of methane.

Carbon dioxide would burn according to the reaction



Or 2 volumes of carbon monoxide require 1 volume of oxygen.

In gases composed of only carbon and hydrogen there will be required 1 volume of oxygen for each atom of carbon present and $\frac{1}{2}$ volume of oxygen for each atom of carbon. Thus in the case of acetylene, C_2H_2 , there will be required 4 volumes of oxygen.

COMPOSITION OF AIR, ETC.

	By Weight	By Volume
Oxygen	23.1%	20.8%
Nitrogen	76.9	79.2
	100.0	100.0

Air = Oxygen $\times 4.329$ Oxygen $\times 4.808$
 Nitrogen = Oxygen $\times 3.329$ Oxygen $\times 3.808$
 4.81 cu. ft. air contain 1 cu. ft. of oxygen.
 53.64 cu. ft. air contain 1 lb. of oxygen.
 4.33 lbs. of air contain 1 lb. of oxygen.
 1 lb. air occupies 12.387 cu. ft. at $0^\circ C.$ and 760 mm.
 1 cu. ft. air weighs 0.08073 lb.
 1 cu. ft. nitrogen weighs 0.07830 lbs.
 1 cu. ft. oxygen weighs 0.08922 lb.
 1 cu. ft. carbon dioxide weighs 0.12268 lb.
 1 cu. ft. carbon monoxide weighs 0.07807 lb.

OXYGEN AND AIR NECESSARY TO BURN 1 CU. FT. OF VARIOUS GASES

Gas	Oxygen Cu. Ft.	Air Cu. Ft.
Hydrogen	0.5	2.41
Carbon monoxide	0.5	2.41

Methane	2.0	9.62
Ethylene	3.0	14.43
Example: Air required for gaseous fuels.		
ANALYSIS OF PRODUCER GAS		
Carbon dioxide	5.8%	
Carbon monoxide	19.8	
Hydrogen	15.1	
Methane	1.3	
Oxygen	1.3	
Nitrogen	56.7	
	100.0%	

The combustible gases are carbon monoxide, hydrogen and methane. One hundred cu. ft. of gas contains 1.3 cu. ft. of oxygen, which, of course, deducts from the amount needed in the air supplied. The easiest way to calculate is to deduct from the hydrogen 2 volumes for every volume of oxygen present; hence, the oxygen in 100 cu. ft. of producer gas will burn 1.3×2 , or 2.6 cu. ft. of hydrogen, leaving $15.1 - 2.6$, or 12.5 cu. ft. of hydrogen to be burned by outside oxygen. Using the combustion data in the table just given.

For carbon monoxide.....	19.8 \times 0.5
For hydrogen	12.5 \times 0.5

	32.3 \times 0.5 = 16.15 cu. ft. Oxygen
For methane	1.3 \times 2 = 2.60 cu. ft. Oxygen

For 100 cu. ft. producer gas.....	18.75 cu. ft. Oxygen
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Since 4.81 cu. ft. air contains 1 cu. ft. oxygen, $18.75 \times 4.81 = 90.02$ cu. ft. air for 100 cu. ft. gas, or 0.900 cu. ft. of air for 1 cu. ft. gas.

(To be continued)

Rhode Island Investigators Favor Lime Under Present Conditions

SIX YEARS' EXPERIMENTS made to compare a high magnesium slaked or hydrated lime and a 10-mesh ground limestone from the same original rock are reported in a recent Rhode Island Experiment Station Bulletin. The following siftings from the limestone also entered into the comparison: Ten to 20 mesh, 20 to 40, 40 to 80, and all finer than 80 mesh. The crops grown each year were mangels, carrots, alfalfa and barley. The additions were made on the basis of equivalent acid neutralizing value. During the first season the 80-mesh limestone had the same effect on growth as the hydrated lime, and the percentage of this grade in the 10-mesh limestone was a measure of the efficiency of the calcium oxide equivalent of the unsifted limestone for the crop immediately following its application.

It was found that where lime is much needed, about $2\frac{1}{2}$ times as much ground limestone by weight, depending upon its fineness, was required to exert the same effect as hydrated lime. The effect of the 10-mesh limestone during the third, fourth, and fifth year after application was greater than the equivalent amount of hydrated lime, but the greater activity

of the latter in the first years placed the average slightly in favor of the hydrated lime. It is stated that a selection from these two kinds of lime should depend mainly on the relative cost per calcium oxide equivalent, delivered on the land. Increasing costs of transportation and containers tend to place the advantage with the material having the higher analysis.

Terrazzo Floor Chips

THE FOLLOWING SPECIFICATION for terrazzo flooring is furnished by Starret and Van Vleck, a prominent firm of New York City architects:

The marble chips used shall be as selected by architects, from samples to be submitted, and shall be of such size as will pass through a $\frac{3}{4}$ -in. mesh and be retained on a $\frac{1}{4}$ -in. mesh.

The mortar shall be composed of one

part of approved Portland cement to two parts of clean white sand.

The fill will be brought to within approximately 1-in. of the finish floor under another division of the work.

Immediately after the fill has been placed and before same has set, spread a bed of mortar containing as large a percentage of marble chips as possible.

Screed to a level surface and sprinkle over the top with enough seeding chips to allow as large a percentage as possible to show on the surface. Roll in the chips and when set rub with an approved machine to a smooth durable surface.

Wash clean and finish with a coat of oil.

Lay the floors in sections, with joints extending through the layer of terrazzo.

The part of this of most interest to rock products producers is of course the specification for the chips. Nearly all specifications for terrazzo are based on experience with Italian marbles. American marbles and crystalline limestones, however, are gaining rapidly in favor and in many cases need merely to be shown to be accepted.

Some terrazzo floors are composed wholly of white chips, but the more common have various colored chips. The preparation of these chips is chiefly a screening proposition and any of the vibrating screens on the market are satisfactory for this purpose.

Probably clean white limestone grit could be used in many instances in place of the white sand called for in the specification quoted. Both chips and sand for this purpose must be absolutely clean and free from all dust. These materials are usually shipped in burlap bags of about 100 lbs. or more capacity.

Reconstruction and Production

Preliminary Report of Senator Calder's Committee Recommends Changes in Esch-Cummins Act That Will Limit Power of the Interstate Commerce Commission to "Regulate Industry"

THE COMMITTEE authorized by Senate resolution No. 350, of April 17, 1920, was directed to inquire into the general building situation and to report to the Senate on or before December 1, 1920, such measures as may be deemed necessary to stimulate and foster the development of construction work in all its forms.

The committee has thus far devoted its attention to housing rather than industrial construction. Information as to conditions existing throughout the country has been obtained through correspondence, questionnaires, and field investigations. Information as to conditions existing throughout England and France has been obtained through field investigations by experts. The committee has held hearings in the principal cities of the United States, excepting the far West.

A Housing Shortage

There is no doubt that there exists a serious shortage of housing, not only in the great cities but in the smaller cities as well, even in the far West and South, and that this shortage has a material effect upon industrial growth and upon public health and morals. The total housing construction during the last four years is hardly equal to that of a normal year. Rentals have increased from 25 to 150 per cent. Four years ago a house for a workman cost on an average about \$3000. Today the same house costs \$6000. Houses produced at such cost are beyond the purchasing power of the workmen of this country. To buy such a house or to rent it, a workman would have to pay the equivalent of a rent of at least \$60 a month instead of the \$30 a month that he is accustomed to paying. Industrial development, together with increasing immigration, will add to the present urban congestion.

Interference by Federal Government

The building industry was disrupted during the war by Federal intervention, and has been unable to get back on its feet since the armistice because of transportation, fuel, and labor difficulties, because of the diversion of credit to commercial purposes, and because of handicaps of taxation. The industry would naturally have revived, because of the great need of construction, if it had enjoyed pre-war transportation conditions (both as to promptness of delivery and

low cost), pre-war fuel conditions, pre-war labor efficiency, and if investment capital had not been diverted to other channels, especially through tax-exempt securities, and had not been driven from the building industry by high income and excess-profits taxes. It now seems beyond the power of private individuals, municipalities, or states to overcome the present handicaps of transportation, fuel, finance and taxation.

Federal Government Should Provide Facilities Rather Than Subsidies

The actions of various states in regulatory rent laws, or toward subsidy or toward participation in the housing business, promises no permanent relief. The unfortunate results of the attempts of the English government along such lines are warnings against similar attempts in this country. The Federal Government must assume the responsibility for its war-time acts in curtailing the industry as well as for its peace-time acts in diverting transportation and capital from the industry. While helpful Federal action is justified, such Federal action should be to provide facilities rather than to provide subsidies.

Costs Should Be Reduced

The committee well recognizes that building—including homes—depends upon the cost of transportation, fuel and labor, and that by no possible artifice can buildings be produced at less than the cost of these basic elements; but the committee believes that there is yet much to be accomplished in the way of greater efficiency of labor; in the way of elimination of profiteering in coal; and in the way of transportation, through more equitable rates and through more regular deliveries.

Transportation—Interstate Commerce Commission Should Regulate Railways, Not Industry

The freight rates on building materials were increased some 50 per cent in June, 1918, and some 40 per cent in August, 1920, making a total cost of freight on building materials of nearly \$2.10, as compared with \$1 before the war; the total for other industries being about \$1.75, compared with \$1 before the war. Shortly after the appointment of this committee the transportation facilities of the country were allocated to coal movement through priority orders of the Interstate

Commerce Commission, and the subsequent irregularities of delivery of building materials have been instrumental in bringing about the recent stagnation in the building industry. The committee believes that the issuance of ex parte orders by the Interstate Commerce Commission has occurred without a full appraisal of their consequences by the commission and that such orders have made opportunities for profiteering and have been injurious to general industry. It is the function of the Interstate Commerce Commission to regulate railroads and not to regulate industries. The committee would direct the attention of the Senate Committee on Interstate Commerce to this matter, with a view to amendment of the transportation act in order to check the issuance of ex parte orders. Intelligent supervision of transportation matters should insure the co-ordination and full use of railways, waterways, coastwise shipping, and terminals, so vitally necessary at the present time.

Coal Production and Distribution Should Be Reported to the Federal Government

National development depends upon an ever-increasing supply of power. Heat is as necessary for production, in fact for human existence, as is air or water; its use must be continued from day to day and cannot be deferred or interrupted.

The nation is dependent upon coal as its chief source of heat and power, yet the production and distribution of coal is badly organized and subject to manipulation at the expense of the people.

Coal profiteering, especially as it has followed the priority orders issued by the Interstate Commerce Commission, has continued unchecked by the Department of Justice, and is a national disgrace. Coal speculation has been permitted to monopolize the transportation facilities of the country, retarding necessary construction, and increasing the basic cost of manufacture and distribution of commodities in general. It has bled the home owners, public utilities and the industries.

The imperative necessity of continuity of supply of fuel demands the fulfillment of contractual relations in this industry more than in any other, and yet one of the primary causes for the disgraceful and disastrous conditions during the past six months has been the repudiation of contracts. An exceptional demand not

only brings about reckless and unwarranted repudiation of contracts made for delivery of coal but the substitution of inferior quality at higher prices. Indeed, coal contracts are so drawn as to be breakable in delivery, in quality, and in price.

Our investigation into the coal situation has convinced us that the private interests now in control of the production and distribution of coal, in spite of efforts by some, are actually unable to prevent a continuance or a repetition of the present deplorable situation, and that it is the duty of the Government to take such reasonable and practical steps as it may to remedy the evil.

An inherent responsibility of the Government is the protection of its people. To assure the mining, transportation, and distribution of coal at fair prices is a public duty from which the Government can not escape. But your committee believes that government administration of the production and distribution of coal should be a last resort, as governmental activities should always be directed toward encouragement of private initiative and enterprise.

While the fulfillment of contractual relations is of first importance to the stabilization of the industry in the interest of the consumer, the producer, and labor as well, your committee believes that the Government should at all times be informed as to coal distribution and at this time recommends:

That all coal operators, wholesalers, jobbers, and retailers be compelled by statute to file at regular and frequent periods with some Federal agency reports on the total tonnage produced or handled, the size and quality thereof, the amount of tonnage contracted for, the amount sold on contract and at spot sale, to whom, together with the prices made or received under such contracts or sales, and producers and distributors to make regular reports sufficient to determine their costs and profits, and the corporate interrelations or the communities of interest, if any, between companies producing and distributing coal.

With this and collateral information in the hands of Federal authorities for possible use by the Department of Justice and other Government agencies, prevailing evils as to irregularity in deliveries, inferiority of quality, profiteering in prices, and undue monopoly of transportation facilities should to a great extent be eliminated. But if no other remedy can be devised, it may be necessary to enact some form of Federal licensing to meet the situation.

Fuel thrift by the small user and fuel thrift by the large user through storage, scientific combustion, and transmission should be strongly encouraged by the Federal Government.

Labor—Eliminate Cost-Plus Contracts

The misdirection and exploitation of some groups of organized labor, through grafting leadership, has been revealed in New York City and is reported in some of the other large cities. This has spread to combinations of employers, who, working together with such grafting labor leaders, have combined to force unduly high prices. These conditions are called to the attention of the Department of Justice and that department is urged to prosecute the wrongdoers whenever they are found to have violated the Federal statutes.

The efficiency of labor was decreased during the war through the allocation of young and specially trained men to the war, as well as through the cost-plus system of contract on Government work. The cost-plus contract has been continued since the close of the war because of the uncertainties of delivery and because of the fluctuating spot prices of building materials, due to interrupted transportation. The committee recommends abandonment of cost-plus contracts by the Government, States, municipalities, and by private individuals in order that competition may be encouraged and labor efficiently stimulated.

It is most desirable that the cities and States should take immediate action to promote the establishment of trade schools for the training of apprentices for the building trades. Unless the present drift away from the building trades is reversed the country will find itself short not only of trained journeymen, but also short of competent foremen and, finally, short of practical employers as well.

The American Federation of Labor has formally declared itself in approval of home ownership rather than tenantry, and the committee has received the earnest assurance of co-operation in making good the housing shortage from the national and local leaders of the building trades sections of the Federation.

Private Initiative Should Be Directed and Encouraged

The building codes of the country have not been developed upon scientific data, but rather on compromises; they are not uniform in principle, and in many instances involve an additional cost of construction without assuring more useful or more durable buildings. The committee recommends the creation of a Federal bureau which shall serve as a clearing house of the best knowledge and practices in construction work, to bring about greater uniformity in building codes, conservation in the use of lumber and other building materials; standardization of such parts of construction as may be standardized without interference with design; publication of fluctuations in wholesale prices and publication of avail-

able quantities of supplies of building materials; publication of methods of city planning as well as the sound methods of financing; all to the end that the best knowledge of the country may be collected and disseminated, so that private initiative may be encouraged and directed toward well-located, serviceable structures of good design, and at minimum cost.

Finance and Taxation

There has been an unprecedented demand for trading purposes; much capital which has been used for non-essentials, for hoarding, and for profiteering has been able to yield interest rates and underwriting charges which the building industry has been unable to offer. The flow of investment capital away from the construction industry has been accelerated by the increase in tax-exempt securities, now amounting to some \$14,000,000,000—nearly two and a half times the pre-war total. The steady flow of investment capital away from the construction industry has also been accelerated by the efforts of the Federal Reserve Board to maintain as great a quantity of funds as possible in liquid condition. Long-term deposits, including savings accounts in national banks and trust companies, which have increased to some \$2,000,000,000, have been chiefly used in promoting trade in consumables rather than for capital investment.

The committee recommends modification of the Federal reserve act so as to permit the Federal Reserve Board to direct that a portion of the long-term deposits in the member banks—at least a portion of the deposits in the savings departments—be invested in long-term securities and mortgages, in order to give greater security to the savings and to assist in providing homes for the thrifty.

The committee recommends revision of the taxation system, in order that investment in homes and in general construction may be encouraged. If such revision does not restrict the issuance of tax-exempt securities, reduce surtaxes and excess-profits taxes, it should grant for a limited period tax exemption to real estate mortgages and perhaps to the profits from home building, provided such profits so exempted are reinvested in the construction of other homes.

Taxation on earnings invested in capital commodity should be lower than taxation on earnings which are spent. For the purposes of taxation, profits upon the sale of capital assets should be prorated for assessment during the years of their accrual. For the convenience of the general public, the administration of the Federal income tax system should be decentralized.

Home Ownership

The committee realizes the importance

of encouraging home ownership, particularly on the part of those who are rearing families. It realizes the injustices now suffered at the hands of the so-called loan sharks, and its endorses the principle of the Home Loan Bank bill, which is designed to facilitate a wider distribution of real estate mortgages through standard bond issues based upon such mortgages and exempted from surtaxes. The committee would, however, recommend that this bill be broadened, so that institutions, other than the building and loan associations, who may desire to re-discount their home mortgages under Federal supervision shall be enabled to participate. The relief which such a system of long-term banking promises to the commercial banks of the country on

the one hand and to the home owner on the other, together with the prime security which such bonds would afford to the conservative investor, combine to make the establishment of such a banking system a most desirable national facility and a most promising substitute for governmental participation in the housing business.

Thrift

To the end that popular saving and thrift may be encouraged, the committee recommends that all Federal thrift activities be consolidated under the postal savings branch of the Post Office Department, and that the present postal savings law be amended to provide adequate interest to the depositors, payable quar-

terly, as well as sufficient compensation to the postmasters to call forth their energetic efforts in developing this important national facility.

Co-operation

The committee believes that unless the Federal Government continues to stimulate co-operation of those engaged in labor, transportation, finance, and fuel production with those engaged in general construction that the growing scarcity of homes may eventually force upon the Government an undesirable participation in the housing business, and it therefore seeks authority to continue its investigations and to formulate data which it gathers in support of the recommendations which it may make.

Indiana Crushed Stone Association

Annual Meeting at Indianapolis Denounces Esch-Cummins Railway Law—Road Maintenance to Be Big Issue in 1921

THE PRINCIPAL TOPICS discussed at the annual meeting of the Indiana Crushed Stone Association at Indianapolis, December 16, were the general business conditions and their causes, and road maintenance. When it came to analyzing the reasons why a year that promised everything in the way of good business should end with the worst depression in the construction industry in a generation, it was unanimously agreed that the extraordinary power given the Interstate Commerce Commission under the Esch-Cummins railway law was the prime factor.

The following resolution was passed and sent to the Interstate Commerce Committee of the United States Senate:

The Indiana Crushed Stone Association, in annual meeting assembled:

Resolved: That the attention of the Interstate Commerce Committee of the United States Senate be especially directed to that part of the preliminary report of the Committee on Reconstruction and Production made public December 14, in which it is stated that the extraordinary powers of the Interstate Commerce Commission under certain sections of the Esch-Cummins railway law have been exercised to regulate industry rather than regulate the railways.

As one of the branches of the construction industry which has been all but regulated out of existence by these extraordinary powers of the Interstate Commerce Commission, we respectfully ask the reconsideration by the Interstate Commerce Committee of the Senate of those particular sections of the Esch-Cummins law and their amendment by Congress before another construction season opens.

Form Agricultural Limestone Division

It was unanimously agreed to revise the constitution of the association to permit the formation of a division devoted to the promotion of agricultural limestone. No extensive plans were made at this time, but

it is expected soon to have a field man and to actively co-operate with the state agricultural authorities in extending the use of this soil fertilizer.

It was argued that the farmer will feel too poverty-stricken the coming year to make heavy expenditures for fertilizers, but the general consensus of opinion was that agricultural limestone will be about the last thing the farmer will, or can afford to, dispense with.



Geo. H. Balf, president

Road Maintenance

The keynote of the speeches at the annual banquet was road maintenance. The governor-elect of Indiana practically won his election on this issue. The speakers at the dinner, Secretary Noblett of the Hoosier Motor Club; A. H. Hinkle, chief engineer of maintenance of the State Highway Department, and President George H. Balf, all placed emphasis on the necessity of hanging on to road improvement work that has already been accomplished.

As many of these roads are of the macadam type, it is likely that large quantities of crushed stone will be required for this maintenance work, even if new construction is handicapped for want of purchasers for the bond issues.

Officers Elected

The 1920 officers were re-elected as follows: President, George H. Balf, Monon Crushed Stone Co., Monon; vice-president, E. T. Milligan, Muncie; treasurer, D. M. Gray, Louisville Cement Co., Louisville, Ky. The executive committee consists of A. B. Meyer, Mid-West Quarries Co., Indianapolis; L. H. Hawblitz, France Stone Co., Toledo, Ohio, and O. H. Blinns, Casparis Stone Co., Columbus, Ohio.

A vote was taken regarding the formation of a national mineral aggregate association, which resulted in the unanimous adoption of the following resolution: "The members of the Indiana Crushed Stone Association are not disposed to assist in the formation of a national mineral aggregate association."

Secretary F. W. Connell came in for high praise for the able manner in which he has conducted the affairs of the association and for the comfortable surplus in the treasury in spite of conditions.

Indiana Sand and Gravel Men Hold Enthusiastic Meeting

Denounce Discrimination in Car Service—Great Strides Made in "Know Your Own Material" Campaign

THE TWO BIG ISSUES discussed at the annual meeting of the Indiana Sand and Gravel Producers Association in Indianapolis on December 1 and 2 were priorities and discrimination in railway car service and the progress made by the association along scientific lines through its employment of a civil engineer. Both these subjects are reported in full elsewhere in this issue. A vote was taken regarding affiliating with a proposed National Mineral Aggregate Association with the result that the move was entirely disproved at this time.

The curtailment of open-top car service, begun in June, 1920, was solely responsible for a cut in the year's sand and gravel production for the state of at least 50 per cent and probably nearer 66 2/3 per cent, according to the records of the association. Consequently, meeting at a time when developments had proved that a large part of this curtailment of sand and gravel production was wholly unnecessary and unwarranted, it is not surprising that a large part of the time was devoted to expressions of indignation.

Mr. Nattkemper's paper on priorities (printed elsewhere in this issue) was received with deep appreciation on the part of all present and it was apparent that every effort will be made to rectify conditions before another operating season and to prevent, if possible, a recurrence of such unjust rulings by the Interstate Commerce Commission.

Dr. W. K. Hatt's description of concrete tests at Purdue University was received with great interest. These tests, undertaken on the initiative of the Indiana Association and at its expense, mark an epoch in the history of sand and gravel associations. These Purdue University tests and R. C. Yeoman's use of them for the benefit of the members of the association are described on another page of this issue.

Two railway men scheduled to speak on freight rates and railroad service in 1921 failed to put in an appearance, which was unfortunate, for they could have learned something even if they did not wish to commit themselves.

Annual Banquet

Following the custom established last year many members brought their wives and families and the annual banquet at

the Claypool Hotel was attended by the ladies as well as the members. The banquet was in the nature of a testimonial to E. Guy Sutton, who is retiring as secretary of the Indiana Association to go to Washington and devote his whole time to the National Association of Sand and Gravel Producers. Mr. Sutton acted as toastmaster.



M. A. Neville, president-elect of the Indiana Sand and Gravel Producers Association

Among the after dinner speakers were L. H. Wright, director of the Indiana State Highway Commission, who spoke on the 1921 road-building program of the state, and C. D. Franks, district engineer of the Portland Cement Association.

One of the features of the meeting was a valedictory by H. C. Huffstetter, who has served so untiringly as president of the association for the past several years, and under whose leadership the association conceived and achieved its mission of guiding engineers and users of sand and gravel rather than tamely following rules and regulations based on half knowledge, even if on good intentions.

New Officers

M. A. Neville, of the Western Indiana Gravel Co., Lafayette, was unanimously elected president for the ensuing year.

G. J. Nattkemper, of the Summit Sand and Gravel Co., Terre Haute, was re-elected vice-president, and George V. Miller, of the Granite Sand and Gravel Co., Indianapolis, was elected treasurer.

The new Executive Committee consists of J. C. Coyle, Consumers Co., Chicago, Ill.; H. C. Huffstetter, Brown-Huffstetter Sand Co., Indianapolis; W. S. Baird, Mt. Carmel Sand and Gravel Co., Mt. Carmel, Ill.; H. L. McGurk, Interstate Sand and Gravel Co., Terre Haute, and H. E. Neal, Neal Gravel Co., Mattoon, Ill.

Illinois Sand and Gravel Men Meet in January

THE EXECUTIVE COMMITTEE of the Illinois Sand and Gravel Producers Association has fixed on January 25, 1921, as the date of the annual meeting of the association. The meeting will be held at the Hotel Sherman, Chicago.

In announcing the date set for this meeting the association's business manager, Ben Stone, has this to say: "It is generally admitted now that the recession in business has passed beyond expectations of most people. In a good many instances the expansion which was so confidently undertaken a year ago has cost dearly, but we are told that satisfactory progress has been made in the readjustment of business and that with the turn of the year a much healthier condition will be evident."

Ohio Sand and Gravel Producers' Annual Meeting

THE DATE SET for the annual convention of the Ohio Sand and Gravel Producers Association is January 19 and 20 at Columbus, Ohio. The meetings will be held at the Deshler Hotel.

New Construction Bulletins of Lime Association

THE EASTERN BUREAU of the National Lime Association, Washington, D. C., has issued two new bulletins entitled: "That Hole in the Plaster—You can repair it yourself; materials used; proper proportions and quantities; tools required and how to make them yourself," and "Concrete Pavements and Walks—How to construct them; estimate of amount of materials required."

Nebraska Aggregate Association

Fight for Readjustment of Freight Rates and No Discrimination Between Shippers to Be Made

AT THE ANNUAL CONVENTION of the Nebraska Mineral Aggregate Association, held in Omaha, December 15, it was brought out again, very emphatically, that in organization there is strength, and that strength was needed to combat the Interstate Commerce Commission; that very important changes should be made in the functionings of that body.

V. O. Johnston, president of the National Association of Sand and Gravel Producers, addressed the association on the value of organization. He summarized the actions of the Interstate Commerce Commission, the National Coal Association, the limitations of their own organization, and the functions of an organization.

J. A. Sunderland, of the National Stone Co., Omaha, Neb., stated, in a brief address, that there was need of co-operation and organization of all users of open-top equipment; that it was necessary for sand, gravel, crushed stone and slag to work in a united effort so as to best solve their mutual transportation problem. Mr. Sunderland stated that he did not believe the National Coal Association to be the perpetrators of our transportation ills; that there really was a coal shortage, due to the coal strike in 1919, and that the transportation tie-up was only the natural result of the situation; that it was necessary to issue priorities to relieve the shortage that existed and the clamorous call for coal everywhere.

The transportation ills were caused by the limited equipment of the railroads and a great deal by government interference. Mr. Sunderland believes that the power of the Interstate Commerce Commission to discriminate between shippers is wrong and should be taken away from them; that all shippers should suffer in the same proportion; that the Interstate Commerce Commission is limited, it being a physical impossibility for so small a group of men to control the transportation system of the United States.

Mr. Sunderland also stated that it was wrong to centralize all authority in Washington, that each state should handle its own problems, to force the railroads to buy further equipment, and that this would be the solution of the transportation problem. He stated that on good authority he thinks the coming year will be an excellent one, with great prospects in store for all.

To Ask Readjustment of Rates

F. Cone, of the Consumers Sand Co., Valley, Neb., gave the association a very thorough address on rate conditions in Nebraska. He fully explained the wonderful resources of that state, in a manner that

gained the admiration of all present. Mr. Cone showed by charts and figures a very thorough study made by him of conditions in Nebraska, that the railroads were earning more money on sand and gravel, a low-grade, short-haul commodity, than on any other commodity. What Mr. Cone wants is a revision of rates on sand, gravel and stone on an equitable basis. The figures which were prepared by him will undoubtedly be brought before the state board of railway commissioners. Mr. Cone again brought out the fallacy of centralizing all

authority in Washington and the removal of the right of each state to control wholly local issues.

The association decided to back up Mr. Cone's work in the readjustment of rates on sand and gravel to be presented to the state commissioners. A readjustment on rates on crushed stone will also be requested.

The following officers were elected: Chairman, L. C. Curtis, Lyman-Richards Sand Co., Omaha; vice-chairman, F. Cone, Consumers Sand Co., Valley; secretary, C. E. Walsh; treasurer, Thos. Sullivan. The members of the executive committee also include D. N. Myers, Myers Crushed Stone Co., Weeping Water; W. M. Stoner, Western Sand and Gravel Co., Lincoln; H. E. Glatfeller, Glatfeller & Powell, Central City.

Iowa Sand and Gravel Producers

Special Meeting Takes Optimistic View for Season of 1921—Repeal of Esch-Cummins Law Favored—New Freight Rates proposed

A SPECIAL MEETING of the Iowa State Sand and Gravel Producers, held at Des Moines, Iowa, December 14, showed a very optimistic view regarding the season of 1921.

V. O. Johnston, president of the National Association of Sand and Gravel Producers, in an address pointed out with a great deal of emphasis the value of the Association to the producers. He showed that if the sand and gravel producers had been better organized at the time when priority orders were issued, the Interstate Commerce Commission could never have done what they did. He quoted Daniel Willard as saying that the sand and gravel producers would have to be treated much better in 1921, because of its strong organization, and the fight that it made for its rights during the year of 1920.

Mr. Johnston quoted his speech to the Texas Association, which is printed in full elsewhere in this issue. He stated that the annual convention of the National Association of Sand and Gravel Producers would be held at Louisville, Ky., on January 12, 13 and 14, and urged everybody to be present. He closed by explaining the functions of the national office at Washington, and how they hoped to improve and better it.

Iowa Railroad Commission Attacks Esch-Cummins Law

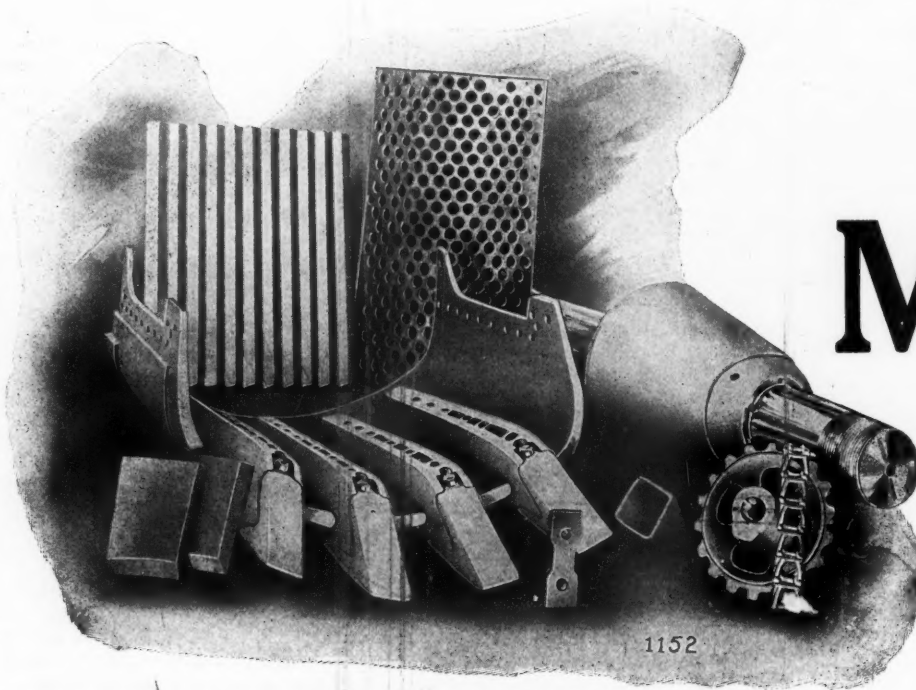
In the afternoon session of the meeting Dwight Lewis, chairman, Board of Railway Commissioners of Iowa, gave a very interesting and instructive address on the transportation situation. He stated that the Esch-Cummins Railway Law was objectionable to them in many ways and

should be amended. This transportation act of 1920 was reviewed in detail, as was also the work of the Interstate Commerce Commission in making a valuation of the railroads.

Mr. Lewis further stated that Commissioner Aitchison of the Interstate Commerce Commission was radically opposed to state control in any way or form. He stated that the state commissioners in allowing the 35 per cent increase did so only temporarily, later intending to adjust the rates on an equitable basis. The carriers accepted this proposition. Even they think that the action of the Interstate Commerce Commission was not good for the country in general.

W. N. Krause, traffic expert for the Iowa State Manufacturers Association, made his report to the association on the rate question, and showed that long haul rates were too high, and short haul rates too low, and that a readjustment of rates should be based upon present prices of the commodity. Mr. Krause had gathered statistics from 14 different shipping points on sand and gravel in Iowa representing 12,000 cars.

It was then agreed by the association that its rate committee be continued so that the report of Mr. Krause could be studied and approved before taking steps to recommend it to the association for a hearing before the State Railroad Commission, this report to be given at a special meeting. No definite announcement was made as to the annual convention, but it will presumably take place after the annual convention of the National Association.



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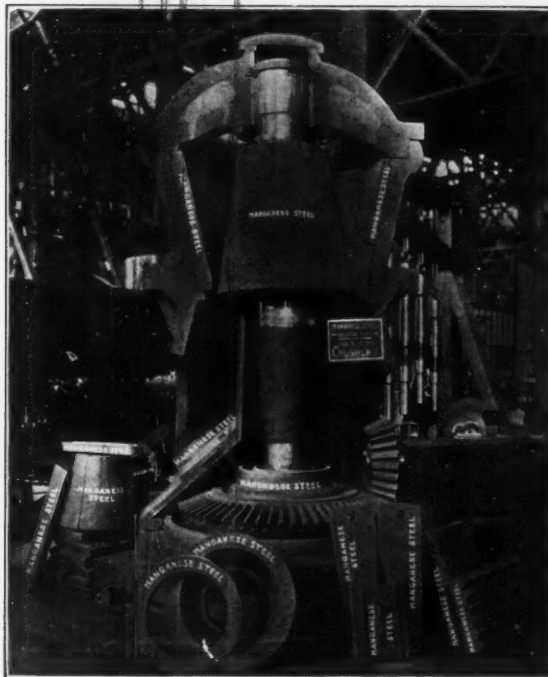


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Wisconsin Aggregate Association

Dissatisfied With Railroad Rates—Recommend Changes in Esch-Cummins Law

THE SECOND ANNUAL MEETING of the Wisconsin Mineral Aggregate Association was held in Milwaukee, Wis., December 16.

O. C. Hubbard, executive secretary of the association, read his report, giving a resume of the more important activities, and the possibilities and things needed in the future. He brought out the fact that the activities of the association were somewhat different than those of the preceding year, due to the perpetual fight on freight rates and car supply. Mr. Hubbard also stated that the association had been instrumental in bringing about the addition of a clause to the State Highway Commission's contracts, wherein it is stated that receipted bills for materials must be shown before estimates will be allowed, and, further, that payment on estimates on 85 per cent of material delivered will be allowed on such material, although not used in the work at that time. This, of course, greatly facilitates the movement of mineral aggregates in the off seasons.

Early Deliveries of Material

Mr. Hubbard further states: "We have supported the Good Roads Association of Wisconsin in their publicity campaign for county bond issues, and have worked with contractors, highway commissioners and others in endeavoring to prove the necessity for earlier delivery of materials on account of the uncertainty of the transportation situation. As proof that we have met with some success in our efforts in this direction is the fact that for the four months previous to May 1, this year, our members, collectively, showed an increase in shipments for this particular period over any previous year. Formerly, producers' operations generally covered a period of approximately six months, meaning that the members must make enough money in six months to tide them over the entire year. We believe now that we have increased this distribution to at least eight months.

"Through the reports of uses in other states, we have convinced the State Highway Department and the county officials that larger sizes of stone and gravel are not detrimental to good concrete pavements, to the extent that some of our members are now supplying stone and gravel up to 2½-in. for this work, without any rejections, as less than 15 per cent ranges above 2 in."

Amalgamation of Associations

"In addition to the activities on our members' behalf, we have originated, started and carried forward all the work toward the amalgamation of the National Crushed

Stone, National Sand and Gravel, and National Slag Associations. Over a thousand letters have been forwarded from our office to producers all over the United States and Canada, in behalf of the matter. These exchanges of letters and these efforts toward this amalgamation have continued since the recommendation of our association at their meeting in May. This has now progressed to the point that the president of the National Association of Sand and Gravel Producers has appointed one of their executive board members to work up amendments to their constitution. These proposed amendments have been submitted to our president, Mr. Blair, for advice and approval. The more important features of these proposed changes are:

"1. That their present name be changed to the 'National Aggregate Association.'

"2. That producers eligible shall be those of stone, sand and gravel, and slag.

"3. That the officers and directors be chosen from producers of all of the various materials.

Recommendations for Future

"First of all, I would recommend that from our members a rate committee be immediately appointed by the president, to go into all the ramifications and possibilities for a readjustment of freight rates on intrastate business.

"Soviet and socialistic ideas are creeping into our state and county politics to the extent at present of an expressed wish to produce their own materials and build their own roads. We absolutely know from past experience that this is false economy and a waste of public funds. It is going to take a fight with every legitimate weapon available to create public sentiment against such uses of public funds, which will take both time and money.

Extension Engineer

"The Indiana Sand and Gravel Association two years ago employed an assistant to their business manager and labeled him 'extension engineer.' This gentleman was hired from the engineering department of one of the state universities, so that he would be looked upon as authority as to the quality of materials, proper inspection of highways and other construction, and as I understand it, is traveling most of his time doing this and any other work beneficial to the members of the association in general. It might be advantageous to add such an outside man to our own association. This man, in addition to checking up the quality of production of material produced by the states and counties, could also pave the way for the later public accountant check of costs of a few of these operations, that we

might have the data to provide the press and the public in an endeavor to stop or to avoid an increase in such activity.

Railway Law Changes

"I believe that our association should immediately make a recommendation to all our representatives and senators in Congress which would take from the Interstate Commerce Commission, the power to declare an emergency without a full hearing of all the facts that may be presented. Further, that the present transportation act be revised so as to eliminate all discrimination between shippers and commodities, and return to the rights given shippers in the original transportation act of 1887."

J. J. Sloan, Wisconsin Granite Co., Chicago, stated that, in his opinion, the most salient features of the present railway rates were that they do not take into account the value of the commodities shipped, the fact that the equipment that the railways give the mineral aggregate men is of the cheapest class, and that there is no limit to the time the commodity spends on the road. He proposed that the rate committee of the association suggest that the railroads take into account the wide variation in class of equipment furnished, value of the commodity shipped, shipment time consumed.

Mr. Blair suggested that a resolution be adopted to see senators and representatives of Wisconsin in regard to taking away from the Interstate Commerce Commission the right to declare an emergency without notice or hearing. He recommended that the Esch-Cummins law be changed.

Mr. Atwood, of the Interstate Sand and Gravel Co., Chicago, then moved that the secretary be instructed to communicate with the Senate Committee on Reconstruction and Production, and with others if possible, voicing the association's approval of the Calder Committee doing away with the power of the Interstate Commerce Commission to declare an emergency without hearing. The motion passed unanimously.

Election of Officers

The president, Mr. Blair, appointed a committee on nominations, which retired. After a recess of fifteen minutes, the recommendations of the nominations committee were approved, and the following officers elected: President, John D. Ohrt, Davis Bros. Co., Lannon; vice-president, J. K. Jensen, Janesville Sand and Gravel Co., Janesville; secretary and treasurer, I. M. Cliequeno, Milwaukee; executive board, A. J. Blair, Lakeshore Stone Co., Milwaukee; E. E. Gillen, Edward E. Gillen Co., Milwaukee; R. C. Brown, Union Lime Co., Milwaukee; Louis Laun, Elkhart Sand and Gravel Co., Elkhart Lake, Wis.

Railway Priority Orders in Times of Peace Are Impositions*

Contrary Both to the Spirit and the Letter of All Previous Laws Governing Transportation—High Time to Get Rid of War Measures

BEFORE THE WORLD WAR priority orders were unknown in the railroad world. In fact, a mere suggestion that the railroads be permitted to favor one industry as against another in regard to the distribution of cars was considered unjust, unlawful, and un-American. Even back in the dark days when rate cutting was a common practice among railroads—which worked quite a hardship with small shippers and was the means of building up trade for the large and influential manufacturers and shippers at the expense of the smaller ones—not one of these railroads during that period felt that it even dared favor one shipper against another, so far as the distribution of cars was concerned.

During my long service in the railroad business, which covered part of this period, I cannot recall one single case where cars were not distributed in strict compliance with the needs of all the shippers, notwithstanding there were periods during this time when an extreme scarcity of all classes of cars existed, but all the railroads managed in some way to move the traffic without favoring one shipper against another, no matter what the nature of the commodity might be.

The world war came on, the railroads were taken over by the government with a view of being able to facilitate the movement of traffic throughout this great country of ours, in order that we might be able to prosecute the war to the fullest extent. The supply of all classes of cars was not adequate to handle the greatly increased business of the country. What could be done to overcome this grave question? Suggestions from numerous sources were made and after due consideration, the powers at Washington concluded that the only way out of this grave difficulty was to issue priority orders, by which cars could be diverted into channels of essential commodities and the non-essential industries would have to close down completely or else take what cars were left after the favored few had received their full quota. This action received a hearty endorsement by the majority of our people. On the face of it, there seemed to be no question but what this policy was a logical one. But

By G. J. Nattkemper

Summit Sand and Gravel Co.,
Terre, Haute, Ind.

what effect did this order have so far as our industry was concerned? It did practically the same thing to us as the good Lord did to the hair-lipped fellow, "It came damn nigh ruining us."



G. J. Nattkemper

The gravel industry was willing to take its medicine and share its part of the burden, but the officers of the National Association as well as those of the various State Association were not at all satisfied with the manner in which the preferential orders were issued as well as the way some of the railroads were exercising them, and they made a desperate effort, and were partially successful, in getting numerous rulings modified, so that we could get sufficient cars to survive the storm, or partially so.

No Attempt to Confine Distribution of Coal to Essentials

In the execution of these preferential orders, great injustice was done to our industry as well as others who were compelled to load open-top cars. This injustice was due to the fact that coal mines

were permitted to load coal and ship it to whom and to whatever territory they pleased. They mostly pleased to ship this coal to people that paid them the highest price, regardless of the distance the coal had to move from the mine and the length of time that it required the empty to be returned to the coal fields. After a time, however, this practice on the part of the coal operators was so apparent that the authorities in Washington concluded to restrict the movement of coal to certain territories and did a very wise thing by inaugurating what was known as the "zone system."

But the crime of it all, and the thing that worked the greatest hardship upon our industry was the fact that coal mines were still permitted to load coal, not to essential industries, but to all sorts of non-essential industries, such as breweries, manufacturers of near beer, glass plants, manufacturers of near beer bottles, toy factories and what not, all of which consumed a very large percentage of the coal produced, and which were permitted, in most cases, to run one hundred per cent of the time, while the gravel plants had to be satisfied with what cars were left after the essential and non-essential factories had a one hundred per cent supply of coal.

Taking it for granted that the authorities at Washington were justified in issuing preferential orders for the movement of commodities to essential plants, then after these plants had received one hundred per cent supply of coal, the non-essential plants using coal should have been given the same percentage of running time as the gravel plants and other industries loading open-top cars; or in other words, if the gravel plants were only permitted to run fifty per cent time, other non-essential plants using coal should not have been permitted to receive more than fifty per cent of their requirements of coal. Had this been done, the burden would have been so divided or so distributed that no industry would have been hurt to any great extent, but as it was, the gravel industry had to shoulder practically all of the burden. So much for the war period.

The Esch-Cummins Act

The Esch-Cummins act has been regarded as a wonderful piece of legisla-

*Paper read at sixth annual meeting of the Indiana Sand and Gravel Producers Association, Indianapolis, Ind., Dec. 2, 1920.

tion and that eventually it will put the railroads back upon their feet. There are certain features of this bill, however, like all legislation, that are bad and will have to be amended. There are two features of this bill which directly affect our industry and which I desire to briefly discuss. The first is covered by Section 12 of this act, regarding the distribution of cars for transportation of coal and the second is covered by Section 15 of this act, regarding the suspension of the operation of rules and regulations in case of shortage and priority in distribution in case of war. Section 12 reads as follows:

It shall also be the duty of every carrier by railroads to make just and reasonable distribution of cars for transportation of coal among the coal mines served by it, whether located upon its line or lines or customarily dependent upon it for car supply. During any period when the supply of cars available for such service does not equal the requirements of such mines it shall be the duty of the carrier to maintain and apply just and reasonable ratings of such mines and to count each and every car furnished to or used by any such mine for transportation of coal against the mine. Failure or refusal so to do shall be unlawful, and in respect of each car not so counted shall be deemed to separate offense, and the carrier, receiver, or operating trustee so failing or refusing shall forfeit to the United States the sum of \$100 for each offense, which may be recovered in a civil action by the United States.

Your national secretary and myself spent several days in Washington at the time the Esch-Cummins Bill was under discussion, or I believe after it had reached the congressional conference committee, and made a strenuous effort to have this section cut out entirely. Failing to do that, we endeavored to get the words "sand and gravel" inserted in this section together with coal, but to no avail. The coal operators had had their powerful lobbyists busy for some time and had convinced the conference committee that this was a question purely of distributing cars among coal mines and had nothing to do with any other traffic and besides, it said nothing as to giving the coal mines preference in the distribution of cars over any other industry. Their statement in a sense was true, but we took the position that such provision, if put in the bill at all, should cover all commodities and that no particular mention should be made of any certain commodity or commodities.

Real Purpose of the Clause Not Accomplished

The principal reason of the coal operators for wanting this section enacted into law, was to prevent assigned cars being placed at certain mines, or in other words, if any mine or mines were running on assigned cars, that such cars should be counted against their running time. They were perfectly justified in this, but for some reason or other, the Interstate Commerce Commission has ruled against them, or in other words, has actually paid

no attention to this section of the law. Certain mines are running one hundred per cent on assigned cars, while other mines are compelled to take their percentage of unassigned cars.

There has been so much complaint made by the coal operators who are loading nothing but unassigned cars, that our President-Elect, Senator Harding, in a number of his speeches prior to the election, made a statement that the Interstate Commerce Commission had exceeded its power in this respect and if he was elected, the Interstate Commerce Commissioners would abide by the law or he would remove them. We all know that Senator Harding was unanimously elected or practically so, and I hope that he will make his pledge good, so far as the Interstate Commerce Commission is concerned, and I further hope that he uses his good offices in eliminating some of the provisions of the Esch-Cummins act, especially the two sections that I have under discussion.

War Powers in Time of Peace

This brings us up to Section 15 of the Esch-Cummins act, which I regard as one of the most damnable pieces of legislation that has ever been enacted, and I know that you will all agree with me after I have read you this section, which is as follows:

Whenever the Commission is of opinion that shortage of equipment, congestion of traffic, or other emergency requiring immediate action exists in any section of the country, the Commission shall have, and it is hereby given, authority, either upon complaint, at once, if it so orders, without answer or other formal pleading by the interested carrier or carriers, and with or without notice, hearing, or the making or filing of a report, according as the Commission may determine; (a) to suspend the operation of any or all rules, regulations, or practices then established with respect to car service for such time as may be determined by the Commission; (b) to make such just and reasonable directions with respect to car service without regard to ownership as between carriers of locomotives, cars, and other vehicles, during such emergency as in its opinion will best promote the service in the interest of the public and the commerce of the people, upon such terms of compensation as between the carriers as they may agree upon, or, in the event of their disagreement, as the Commission may after subsequent hearing find to be just and reasonable; (c) to require such joint or common use of terminals, including main-line track or tracks for a reasonable distance outside of such terminals as in its opinion will best meet the emergency and serve the public interest, and upon such terms as between the carriers as they may agree upon, or, in the event of their disagreement, as the Commission may after subsequent hearing find to be just and reasonable; and (d) to give directions for preference or priority in transportation, embargoes, or movement of traffic under permits, at such time and for such periods as it may determine, and to modify, change, suspend, or annul them. In time of war or threatened war the President may certify to the Commission that it is essential to the national defense and security that certain traffic shall have preference or priority in transportation, and the Commission shall, under the power herein conferred, direct that such preference be afforded.

You will observe at the beginning of this section that the *Interstate Commerce Commission can use its discretion* as to declaring emergencies and setting aside all rules and regulations regarding the distribution of cars, etc., but that this is not compulsory upon its part. While at the latter part of this section, it provides that in time of war or threatened war the President may certify to the Commission that it is essential to the national defense for security that certain traffic shall have preference or priority in transportation and that the Commission shall under the power herein conferred direct that such preference or priority be afforded. This makes it compulsory upon the Commission during the time of war or threatened war to declare these emergencies.

Now then, if the first part of this section 15 was cut out where it permits the Commission to *use its discretion* with regard to these emergencies when there is no war or threatened war and only permits such power to be exercised during the time of war or threatened war, we would have no complaint. Railroads were built and concessions granted them by the people so that they could serve all shippers alike and when we deviate from this principle, the railroads cease to be of public benefit.

Act Should Be Amended

The two sections in the Esch-Cummins act that I have just noted have been the means of working a hardship upon our industry and in many cases almost the ruination of a number who are engaged in the sand and gravel business. They have proved absolutely impracticable. Nobody knows this better than we do, because every provision of these sections has been exercised by the Interstate Commerce Commission. We have been compelled to close our plants for days and weeks, when it was not necessary. We have been forced to have our distinguished secretary, Mr. Sutton, and others in Washington to prevent the Interstate Commerce Commission from closing our plants entirely, and had it not been for the efforts of our National Association and the State Associations we would all be bankrupt today.

We have found where railroads have gone far beyond the instructions of the Interstate Commerce Commission and have issued orders that no cars should be given to the gravel industries until after the mines have been supplied one hundred per cent. The railroads have gone further than this, and some of them have issued orders that no open-top cars should be given to gravel plants for a period of two weeks and before we could get an action through Washington, the time had expired and when we asked for an explanation of the railroads, as to why

such orders were issued, we were told that it was a misconception of the rules or else their interpretations were correct and that the Interstate Commerce Commission told us one thing and they another.

There is no industry that has suffered so much, unnecessarily, during the war and since, as has the sand and gravel industry, and from the attitude of the Commission and the railroads, unless we use drastic measures and keep fighting to the last ditch, we are going down in ruin.

In conclusion I want to say this, that it was not found necessary for railroads to issue priority orders prior to the war and it is not necessary for them to issue priority orders now, and that it behooves this Association as well as all other sand and gravel Associations to see to it that such legislation is removed from the statute books.

How can this be accomplished? The answer is by changing the law giving such unlimited power to the Interstate Commerce Commission. All that part of the law that gives the Commission

authority to grant priority orders in time of peace should be stricken out leaving the Commission with power to act only when we are at war or threatened war and the President certifies that an emergency exists justifying the making of priority orders.

This matter should be taken up by the National Association and through it every state association should be notified to advise their individual members to take it up with their congressmen and senators, and in this way we can get action and have the law changed.

Secretary of Agriculture for Continuing Federal Aid

Road-Building Program for Farmers' Benefit Only Begun—Admits 1920 Program Failed for Want of Railway Service

WASHINGTON, D. C.—Immediate consideration should be given by Congress to plans for extending the Federal-aid road-building program, the period for which by the original act, as amended, terminates with the close of the present fiscal year, declared the Secretary of Agriculture in his annual report to the President made public December 10. In order that there may be no halting in the work it is hoped, he said, that the Congress will, at its next session, provide additional funds, to be expended under the terms of existing legislation with certain modifications, at the rate of \$100,000,000 a year for a period of five years, beginning with July 1, 1921.

Future legislation, the Secretary said, should not disturb the principles embodied in the act of 1916, which have been tried out and found to be so satisfactory, and only those changes should be made which experience has clearly shown to be desirable. He said:

"The principal modifications in mind relate to the problem confronting the Western States in highway work because of the existence in many of them of large areas of public lands, and to the maintenance of Federal-aid roads by the State highway agencies rather than by the counties. The Association of State Highway Officials, at its meeting in December, 1919, unanimously approved the continuance of the present plan of Federal participation in road building with these and other modifications.

"The fact that the present appropriation may not be entirely expended by June 30, 1921, does not lessen the necessity of immediate action. Both the Federal and State highway departments should know, as promptly as possible, the program for the next five years, in

order that the work may be adequately planned and the engineering and administrative details carefully executed. Forty of the State legislatures will be in session this winter, when it will be necessary for them to make the requisite provision for meeting future Federal apportionments. From every standpoint, therefore, it is essential that legislation for the continuance of the program now under way be promptly enacted.

Construction Difficulties

The work of actual construction has suffered from several causes, which varied in intensity in the different States. They include: (1) The difficulty of securing transportation facilities for road materials. During the season of 1920 the assignment of open-top cars for transporting coal resulted in tying up and slowing down many of the highway projects under construction. (2) The lack of materials, particularly cement, steel, and culvert pipe. In general, the short supply of sand, gravel, crushed stone, and other similar materials has been due to transportation difficulties rather than to a shortage of production. (3) The lack of available contractors and labor. This condition was not general, however, and was partially caused by the unwillingness of contractors to undertake new contracts rather than to an actual lack of sufficient organizations. (4) Difficulties experienced in disposing of road bonds. This situation existed only in certain States, and was due largely to the advance in interest rates generally after the rates for the bonds had been fixed.

In order to provide for the full correlation of the work of the department and of the State highway agencies, the ad-

visory board has been enlarged to include all the members of the executive committee and the officers of the Association of State Highway Officials. There is thus available to the department, in formulating administrative policies, the advice and experience of the State executives in actual charge of highway work, representing all parts of the country.

Germans Ready to Swap Cement for Coal

ONE DEVELOPMENT of the impasse in import and export business between Germany and other countries growing out of the depressed value of the German mark has come as a modification of the barter system. Arrangements have been made by various British interests whereby there is practically an agreement on the part of German manufacturers to manufacture goods for account of the British or other interests out of raw materials furnished by the latter and for a percentage of the goods as a commission or profit.

A proposition made by a German cement factory to American interests who are anxious to secure cement in Europe provides for a similar arrangement whereby Americans shall send to German cement manufacturers a supply of coal on credit for such time as may be necessary to manufacture cement. Other materials for the manufacture of the cement will be bought in Germany by the cement makers as agents for the American importers and the German manufacturers will operate their plant and thus manufacture the cement entirely for account of the American importers and at a fixed rate of commission or profit on the output manufactured from supplies thus furnished. This method is being followed in an increasing number of cases and is being favored by some of the best German banks. Various Netherlands interests are following this method of doing business not only in cement but in many other lines of manufacture.—U. S. Consular Reports.

Engineer's Value to Association of Gravel Producers

Experience of the Indiana Sand and Gravel Producers' Association Ample Proof of Advantages to Producers in Having Services of Trained Engineer at Their Command

THE DESIRE TO KNOW as much about the technical requirements of their product as the users themselves know has been the very laudable ambition of the leaders of the Indiana sand and gravel industry for some time past. A year or more ago, to carry out this purpose, they employed a graduate civil engineer to check up the arbitrary decisions of users of sand and gravel respecting its quality for use in concrete, and the results of this move speak for themselves.

In spite of the fact that the fight made by this association for lower freight rates and for car service seriously interfered with the program outlined for its engineer's services, the engineer, R. C. Yeoman, has accomplished a great deal more than was necessary to justify his office in this or any similar association. The precedents that this association has set could well be followed by the other state associations and by the national association.

The Purdue Tests

In order to have substantial ground on which to proceed, the association arranged with Dr. W. K. Hatt, director of the department of civil engineering at Purdue University to carry out at the University's testing laboratory under his supervision a complete series of tests of concrete made of Indiana sands and gravels. Dr. Hatt is an international authority on concrete and testing laboratory work, so that his conclusions are unquestionable.

To do this certainly required moral courage and confidence, as well as good business sagacity, because there was no assurance that the tests would be at all favorable to the sand and gravel producers, and their cost ran into many hundreds of dollars. It is pleasing therefore to be able to record that this enterprise and initiative was rewarded with results of great value to the sand and gravel industry and also of much interest and value to the engineering profession.

To a considerable extent these tests were aimed to prove or disprove the reasonableness of the 5 per cent. sand tolerance clause in gravel specifications. That is the Indiana highway specifica-

tions for gravel for concrete (and many other states as well) have a clause defining sand as material that will pass a $\frac{1}{4}$ -in. mesh and limiting the amount of sand that may be retained in the washed gravel to 5 per cent of the volume of the gravel. The attempt to keep the fine material down to 5 per cent or less often



R. C. Yeoman

results in an uneconomical operation and works a hardship on the producer.

In a nutshell Dr. Hatt's tests prove conclusively that it makes practically no difference, so far as quality of resulting concrete is concerned, whether the tolerance allowed is 5 per cent or 30 per cent. The tests also proved that the definition of sand as material passing a $\frac{1}{4}$ -in. mesh is entirely arbitrary and that identically as good concrete could be made using the customary proportions and defining sand as material passing a $\frac{1}{8}$ -in. mesh.

Dr. Hatt's conclusions were: "The increased output of the plants of the state and the conservation of our gravel beds by providing for the use of the excess coarse sand would justify an increased tolerance, at least to 15 per cent, because this can be done without a de-

crease in quality. With this tolerance on a $\frac{1}{4}$ -in. screen, some provision should limit the amount of tolerance below the $\frac{1}{8}$ -in. sieve, say to 5 per cent."

Work of the Association Engineer

Mr. Yeoman describes his duties of the year as follows (omitting the extra duties brought about by car-shortage and freight-rate problems):

"During the past year I have visited nearly every plant in the state and conferred with practically every producer. This experience has given me an intimate knowledge of the problems of the average plant, and contributed immensely to the strength of my efforts in solving problems described later.

"The question of the 'intolerance on the $\frac{1}{4}$ -in. separation' became a critical issue early in the season. The president appointed a committee of members to confer with their engineer. The result of this conference was the determination to undertake the tests at Purdue already referred to.

"Besides these independent tests of gravel concrete at Purdue University the association has established its own laboratory for making physical tests of sand and gravel. This laboratory has made about fifty tests of materials of various plants and for different purposes. These tests are a beginning of a state survey, and already, when added to the Purdue and State Highway Commission tests that are available, give us a fund of information about our own material that is quite comprehensive.

"These laboratory data have served a very useful purpose in a number of instances this season. The most significant was the saving of state highway business for eleven plants, which would have been arbitrarily ruled out except for the showing made by these screen analyses. It was planned by the state highway commission engineers to adopt an intermediate sizing limit on the coarse aggregate specification, that these 11 plants would not have been able to fill without great waste and expense. In view of the proportion of state highway and local business, it is certain that both producer and the state would have lost by this ruling. On the showing of the character of prod-

ucts produced by these plants a change was made admitting them.

"One local contractor who had prepared his sub-grade and placed his machinery ready for work was rescued from a shut-down by a demonstration of the practicability of the grading and quality of material from a local plant. The local material which he was able to obtain by truck was rejected because of the 'intolerance' clause. Your engineer clearly demonstrated that a 1:2:5 mix on a No. 8 division was practically equal in every respect to a 1:3:5 mix cutting on a 1/4-in. as specified. The 1:2:5 was adopted and the work was allowed to proceed.

"Another producer had let the State Highway Commission sample his deposit. The sample was incorrectly taken and showed his material to be not much better than coarse sand. Your engineering department record of his material showed A-1 quality in every respect. A new test was requested by the writer and the material given its proper standing.

"Another producer, who makes crushed boulders, was up against a crushed limestone, or its equal, specification. The road officials would not accept his material as a substitute, although available by short wagon haul from plant and therefore cheaper, until substantial evidence of engineering character was presented. The writer secured from Purdue University the necessary recommendation and the job was sold.

"For the past few weeks there has been a special committee on gravel specifications for Marion County. The deliberations of this committee developed a tendency for hair-splitting on the grading of gravel. The association's representative (G. V. Miller) refused to approve the conclusions of the committee and the matter was referred to your engineering department for study and report. The negotiations are yet under way and appear to be near a practical solution that will not only insure that all clean and commercially graded sand and gravel will be suitable, but that a better, rather than a poor concrete may result in the use of the local materials divided on a No. 8 instead of 1/4-in.

"As mentioned above, it was planned to cover the state in a survey for statistics of buildings, specifications and opinions on sand and gravel. About twenty counties have been reached and the engineers and road superintendents visited.

"The State Highway Commission specifications for the use of our materials in construction is undergoing revision and the new specifications are reported to be more practical than the 1920 specifications. Proper recognition has been made of the efforts of the association in the study of the use of sand and gravel in concrete as shown in the Purdue tests."

Labor Supply in Many Sections Getting More Plentiful

Big Industrial Centers in the East and Central West Show Most Depression

NEW YORK.—The National Industrial Conference Board has made public a summary of reports received in response to a telegraphic inquiry as to unemployment throughout the United States at the present time.

The situation in general, as revealed by these reports, may be characterized as a widespread industrial depression.

The facts in regard to a number of states as reported by official state departments to the conference board are as follows:

NEW ENGLAND.—In this district the picture is darkest, because of the depression prevailing in the textile and other industries.

RHODE ISLAND.—Textile mills working on half or one-third time; number of employes in machinery and tool establishments decreasing. Conditions approaching a state of unusual unemployment.

MAINE.—The shipbuilding, shoe, and cotton industries seem to be decreasing. We expect the woolen industries to start picking up in the near future.

MASSACHUSETTS.—There has been little change since September in the unemployment situation. Figures derived from trade union sources indicated at that time about 19.3 per cent unemployed, mostly in boot and shoe and textile trades. It would appear that conditions are improving in most of the industries of the state.

EASTERN STATES.—Employment in this district is declining, but is still above pre-war levels.

NEW YORK.—Index number of employment, based on conditions in June, 1914, as 100, is 114 for October, 1920 (preliminary estimate), as against peak of 122 in October, 1918. Chief statistician of the state says: "No upward tendency in employment is yet visible. In fact, it appears not unlikely that further reductions in factory employment will be reported."

PENNSYLVANIA.—Director of department of labor and industry says: "Unemployment conditions are not nearly so bad as they were in 1913 and 1914. In a few lines unemployment may be temporarily increasing, but not at an alarming rate."

NEW JERSEY.—Unemployed steadily increasing. Passaic textile industries working half time; shipbuilding decreased one-third; building trades occupied to normal capacity; stove works normal; boiler works normal; silk hosiery normal;

woolen mills working four days a week; metals and machinery slow; talking machines, force increased."

SOUTHERN STATES.—Conditions in this district vary considerably.

GEORGIA.—Textile mills running on half time, automobile plants practically closed down; other lines feeling depression, but not to same extent.

VIRGINIA.—No factories have shut down entirely; however, many of them are retrenching the least bit.

TEXAS.—Unemployment is rapidly on the increase; outlook for the winter season is rather discouraging.

OKLAHOMA.—There are perhaps less unemployed at this time than during the same period for several years previous to the war. Many transients are drifting into the state, which, if continued, will have a decided effect on employment conditions.

CENTRAL STATES.—The automobile centers in this district are severely depressed; in other centers conditions are nearly normal.

INDIANA.—Unemployment throughout the state of Indiana is approximately placed between 50,000 and 75,000. At least 75 per cent of this number is chargeable to automobile and kindred industries. Unemployment is on the increase. Surplus, however, is being somewhat relieved by a noticeable drift back to the farms.

ILLINOIS.—It would seem that unemployment is gradually increasing particularly where workers are anxious to secure a certain kind of work at a high wage. Unemployment in the various trades touches common labor and clerical labor most closely.

MICHIGAN.—Unemployment in Michigan is widespread throughout the automobile centers.

WISCONSIN.—Applicants for work have numbered nearly the same as in 1919. There is this difference however, that a larger percentage of the applicants now are men seriously in need of work, while in 1919 they were men desiring to change jobs.

WESTERN STATES.—States dependent on logging as a principal industry report unemployment, other states either a normal condition or a labor shortage.

CALIFORNIA.—From data received, conditions in California are normal.

WASHINGTON.—Unemployment is increasing, due to closing down of lumber mills and camps.

Even Mineral Aggregate Producers Have Constitutional Rights*

The Interstate Commerce Commission Cannot Deprive American Citizens of Personal Liberty and Property Without Due Process of the Law

I AM NOT HERE TODAY so much in the capacity of president of our National Association as that of a practical sand and gravel producer—one who not only has gained a knowledge of your problems in the school of experience, but also, during the past year or two, has had an unusual opportunity to view and consider some phases of the business a little removed from its routine activities. I have been able to talk with many representatives of the railroads' and shippers' associations; I have met the officials of other building material associations, traffic experts and Government employees; I have heard much testimony from them and others before the Interstate Commerce Commission and elsewhere as to conditions throughout all sections of the country with reference to transportation, and I have had ample opportunity, in the thirty-odd thousand miles traveled this year to observe at first hand the congestion of the railroads at many terminals and the unequal distribution of their equipment. I have had the facts on which to base some very definite conclusions with reference to our existing ills. Furthermore, as a charter member of both the National and Illinois associations, I come today as one who has tasted the milk and honey of the promised land, who has shared in the benefits flowing from organization and who firmly believes that these benefits should be extended to all producers, thereby hastening the day when the mineral aggregates industry shall assume its rightful place in our national construction program.

The wise man reads his future in the past, and by so doing is able, if the prospect is not pleasing, to fortify himself for the coming ordeal and possibly take steps to better his condition. How many of you, I wonder, during the year now drawing to a close, have turned from your customary duties to give consideration to the past and present status of our industry as a whole—have endeavored to find in the trying experience of the last few years a forecast of the next? Those of you who have not had an interesting and probably a profitable duty to perform—a duty to your own financial interests and those of your customers; a duty materially affecting the general welfare of

By V. O. Johnston

President, National Association of Sand and Gravel Producers

the land in which you live. Such consideration will lead you, substantially, to the following conclusions:

A Post Mortem

We came through the war somewhat warped and battered. Rising costs and decreasing markets were reflected in our balance sheets. We had gone without cars, without coal; we had curtailed our repairs, especially those requiring steel, copper and rubber, and we had sent the younger members of our organizations to the front—all as a matter of patriotic necessity. After the war we realized that financial and industrial conditions were far from normal; that the railroads which have properly been likened to the arteries through which the commerce of a nation flows were crippled and inadequate to serve the pent-up needs of the country, and that labor was suffering from too much prosperity and lacked an incentive to efficiency. We still had faith, however, that an industrial balance would soon be struck and that business, so long subordinated to war needs, would be resumed on a bigger scale than ever. Hard roads, housing and manufacturing structures were being planned in every section of the country. Our products, we urged, were primary in and vitally essential to all these forms of construction work and we were bound to share in the coming prosperity. We therefore enlarged and improved our plants, rounded out our sales and production forces and otherwise prepared for a large and profitable business. For us, 1920 was to be the year of Jubilee! AND THEN—THE BLIGHT STRUCK US! Declaring an "emergency," which existed only in the minds of the greedy coal interests, the Interstate Commerce Commission ordered cars to be taken from us and delivered to the coal mines. In July our output was reduced to 22 per cent of our capacity. Many of our plants shut down entirely. The teams and trucks that normally would have been hauling our materials were idle. Bricklayers, plasterers, concrete workers and laborers began to mark time. Houses,

elevators, warehouses, silos and hard roads were at a standstill. Drainage and conservation projects, sewage disposal plants and hard roads were crippled. Locomotives began to slip for want of engine sand and the railroads of the country actually were losing \$300,000 per day. This is the price industry paid, and is still paying, unnecessarily, as we believe, and without adequate benefit to anyone except coal operators.

Constitutional Rights Infringed

The Transportation Act of 1920, as interpreted and executed by the Interstate Commerce Commission, aided and abetted and advised by the railroads and the National Coal Association, disfranchised the sand and gravel industry. Until the passage of that act we were citizens—our rights guaranteed by the Constitution and our property protected by the flag. Since then, as you know all too well, our liberty to pursue our business freely and on equal terms with all others has been abridged; our industrial life has been placed in jeopardy; and our property, to the extent that transportation has been denied us unnecessarily, in practical effect, has been taken from us without due process of law. In support of these statements let me quote briefly from the opinion of Francis B. James, the attorney who is representing our interests in Washington: "Due process of law means notice and hearing. The Interstate Commerce Commission can only act upon information of some kind, and such information to constitute due process of law should be furnished at a hearing of which due notice is given so that all persons affected as to their property and liberty in the pursuit of their business may have an opportunity to present facts so that the order of the Interstate Commerce Commission shall be based upon facts constituting an emergency, or the facts may show that no emergency exists. Due process of law not only affects the property rights of a citizen, but also affects his liberty. Liberty within the meaning of the Constitution is not merely limited to personal liberty, but includes freedom to follow business pursuits."

In the light of this opinion we stand today as the victims of the most colossal discrimination ever perpetrated on an industry. The construction and building

*Address before the sand, gravel and crushed-stone producers of Texas on November 6, 1920.

industries of the country have suffered an estimated aggregate loss of over \$3,000,000 per day since the commission began in June to issue priorities favoring coal. This pettifoggery with the economic laws of supply and demand, through their interference with transportation, has caused a more widespread, permanent and irreparable economic loss to the nation, by many fold, than could have resulted from the merely prospective, sectional "emergency," so-called, which it was designed to correct. In other words, our Government, in the exercise of its regulatory powers over the railroads, has not secured to our industry, on equal terms with others, those rights which, in peace times at least, may not lawfully be denied! And the coal profiteer, under cover of Government priorities, has continued by exorbitant prices to tax the boilers of our national industry and the furnaces of our homes to the extent of approximately \$4,000,000 per day.

A Word About Coal

We know, thanks to the valuable work of the Federal Trade Commission, the cost of producing coal in every state in the Union—and we also know, from sad experience, its selling price. (As a matter of fact, we know more about coal than we do of our own products.) We know that production of soft coal so far this year exceeds that of last by more than 50,000,000 tons, and is now averaging over 12,000,000 tons per week. Why should coal be scarce and the price thereof show a profit of from 100 to 300 per cent? We are exporting coal at the rate of only about 1,600,000 tons per month. Are we sending this amount to Italy, France and others of our ex-allies in the great war as a part of our international duty? No! Were the sympathies aroused during the war for their sufferings such that we are doing it as a matter of altruism? Far from it! Nor is it because our State Department at Washington has "committed" us to such a program. If this were the case we could better bear the extortion here at home. We are doing it because, taking advantage of their dire necessity, we can wring from them four times a fair price with no fear of prosecution for profiteering, while you and I in the midst of plenty must bid for our supply against him with whom it is a life and death matter.

Consideration of these iniquities leads us to inquire why and how, in the name of law and justice, they were first conceived and then allowed to continue. I will answer that question briefly as follows: Transportation was short; there was not enough to go around and someone must be deprived and would suffer. Who should it be? We, the chief competitors with coal for open-top cars, as an industry, were but little known. Our importance as employers of labor and

producers of railroad revenue had not been recognized. The economic value of our products had not been appreciated. As an industry we lacked publicity, we lacked cohesion, we could be attacked with impunity, not having the means of making a unified and effective protest. And so, in this year of all others when our products were needed most, we were repressed, our protests went unheeded and our chance to do business depended largely on the whim of the particular railroad on whose line we were located.

What We Don't Know

In thus summing up the situation in which we approach the close of our season, we must not forget that we are partly at fault ourselves for our unfortunate condition. How can we expect the public to appreciate our importance if we do not know it ourselves? And we do NOT know today, within several hundred, how many producers there are in the country! We do NOT know, within a good many million dollars, the actual value of the investment involved in our business. We do NOT know, within a good many million tons, the extent of our production nor the sale value thereof! We know but little about the actual revenue accruing to the railroads from transportation of our products, or the number of cars necessary to transport them. As an industry, in fact, we are downright ignorant of the statistics needed to emphasize our economic importance. Efficiency is ever based on knowledge and not ignorance. "Know thyself" has been an oft-repeated bit of advice to him who would succeed, from the days of Grecian glory to these modern, practical times, but our industry has failed to heed it, has failed to tabulate and marshal its resources, or compute its potential strength, and for this neglect is now paying a heavy penalty.

Let us turn from this unpleasant review of our immediate past to a consideration of ways and means available to us in securing our rightful place in the sun of liberty and prosperity. Our forefathers, to combat the evils of their time, combined the resources of the individual states into one nation—thereby securing the welfare of all. Germany was by way of conquering Belgium, France, England and possibly this country, taking each in turn, and was defeated only when a united resistance was made to her aggressions. The old maxim, "In union there is strength," has gained added prestige with the passage of the years, until today organization is the antidote for many industrial ills.

Has it ever occurred to you as being a highly significant sign of the times that nearly every phase of human activity—be it social, religious, artistic, scientific or commercial—is organized? That every line of work with which ours comes in

contact has its organization? Have you ever paused to inquire the reason for this? And having found it, stopped to wonder why, being so simple, the principle has not more generally been applied to the sand and gravel business? There's just one answer—we've been asleep!—out of touch with the big movement of modern business!

Other Organizations

The railroads, which transport our products, are most intensively organized. Their traffic men, their security holders and their officials are leagued together in efficient associations, and function as units in their various activities. The Car Service Commission, through whom orders of the Interstate Commerce Commission are executed and which during the current year has assumed to issue a few orders of its own, is a noteworthy instance of their consolidation for common benefits and added strength. The State Highway departments, which direct the road building of the country, and the engineers and architects who draw the specifications for our products, are well organized. The retail lumber yards, the contractors and dealers in building material, all support national associations. Labor, organized and conscious of the extent of its power so gained, has demonstrated again and again, especially since the beginning of the war, the value of concerted action and a forceful leadership. The coal operators of the country, our chief competitors for open-top cars, functioning as the National Coal Association, have been able by means of their organization, to dominate the action of the railroads and greatly influence Governmental regulations of transportation. In support of this let me quote from Chairman Clark of the Interstate Commerce Commission:

"In our efforts to secure the largest possible production and transportation of coal, we are having the active and cordial co-operation of the coal operators as represented through the National Coal Association and of the railroads as represented through a committee of the Association of Railway Executives, as well as the representatives of many of the large users of coal, who in turn furnish service and essentials to the public. The matter is a subject of almost daily conference."

Value of Associations

The list of national associations, industrial and otherwise, might be continued indefinitely, and include co-operative efforts of farmers, wool growers, cotton planters, fruit raisers, and many others, ranging in financial and economic importance from the American Bankers Association to the National Association of Street Fakirs. The insurance companies which fix your indemnity insurance rates are organized. The public utilities from

whom you buy your power are organized. The manufacturers who make your machinery are organized. When we survey these organized activities of American life today, the hand-writing on the wall becomes plain—the sand and gravel industry, as a mere matter of protection, must organize—must stand united against aggression and in the maintenance of its industrial rights; or, divided in its efforts, fall below the level of profitable enterprise.

Not only, however, as a means of protection against our common adversaries must we organize, but also for the better co-operation with those industries linked with ours, and more or less dependent on us. Cement, lime and brick in their use in construction work, require sand. Lumber, steel and stone must wait on a supply of sand. Without it their market falls and consequently they are vitally interested in our transportation troubles and will join with us in any effort to remedy them. The combined influence of the construction industries is sorely needed at this time to foster the building of homes, hotels, storage and warehouses, hard roads, and other means of reducing living costs. We have common aims and interests in the furtherance of our national construction program and dare not overlook the value of concerted effort and mass attack.

One of the very best arguments in favor of association is that it pays a handsome profit. I do not refer to price-fixing, pools or other illegal restraints of trade—the days when those devices were profitable are past—but I do mean that strictly within the law, association activities breed a prosperity founded on a sound and well-recognized economic basis. A knowledge of cost of production is an essential prerequisite to any intelligent price-making and usually and naturally causes a stiffening of the backbone when a buyer attempts to batter prices below a fair margin of profit or a less intelligent competitor vainly endeavors to make a profit by selling under the market price. Statistics compiled by the Government show that out of 250,000 business corporations in this country more than 125,000 are operating without a profit. More than 175,000 are not earning sufficient to pay the salary of a good executive. Of the entire 250,000 only about 12,500 know what it actually costs them to make their goods. This undoubtedly explains also the Government figures which show that out of every 100 business enterprises started, 95 per cent fail. The establishing of a uniform and accurate cost system, dissemination of information among its members as to depreciation, depletion, obsolescence and other items, is a proper and profitable function of an association and of practical benefit not only in reference to prices, but also to income-tax returns.

Let me summarize: Membership in an association, should, and usually does, mean protection, profit and pleasure; it means to a member the backing and influence of the entire industry in time of need; it means to each the benefit of the experience and training of other members; it means education, relaxation and progress. No concern is too large to need or profit by it—none so small or isolated as to attempt to stand alone. Whether local, district or state associations are being considered or a national association, the argument holds true. Each has its problems and each is necessary to round out the entire field of organization and recruit to full fighting strength an industry.

National Association Program

In conclusion, let me tell you of the part our National Association is proposing to play the coming year. In criticising our industry for its backwardness in seizing the benefits of organization, I do not want to be understood as belittling the work our association has already accomplished. I have no apologies to make for it and only ask you to remember that it is still young, that its activities have been constantly limited by its income and that it takes time to develop an efficient executive force. Our program for the current year was sadly upset by the necessity of concentrating our efforts on the matter of rates and car supply. What we accomplished in those cases was largely of a negative character, but we were in the front of the battle and bore the heat and burden thereof, and did acquire a world of useful experience. We secured recognition at Washington and from the railroads as the chief competitors of the coal mines for cars and the only other persistently active national association fighting for them. (And I may say, in passing, that our financial resources for this work amounted to only about 2 per cent of the war chest possessed by the National Coal Association.)

We have gained valuable publicity for our industry and the co-operation of other organizations. We have added most materially to our membership until it represents today between 60 and 70 per cent of the production of sand and gravel in the country. We have stimulated the loyalty of our older members. If the old adage, "Well begun is half done," is true in our case, we may, with due pride consider ourselves well on the way in realizing our ambitions for our organization.

In these closing months of the year, however, our faces are set toward the future and we are not spending much time in holding post mortems over the various events of the year. We realize the greatness of the opportunity before us and recognize fully our responsibility. The construction work of the country, repressed throughout the years of war

and crippled during the present year by the breaking down of railway transportation, cannot longer be postponed. There is in this country today an excess of families over dwellings in which to house them of nearly 23 per cent. During the next five years we will attempt to spend in this country over \$3,000,000,000 for hard roads. This program exceeds the greatest five-year period of railroad building by over \$2,000,000,000. A nation's necessity cannot be denied and another year will see resumption of building on a larger scale than ever before. Transportation conditions are slowly improving, orders for railway equipment are being filled; labor is beginning to recognize the necessity for efficiency. Spring will see coal a drug on the market and cars becoming more available for our product and—we will begin to come into our own.

We are locating our office in Washington, there to maintain before Governmental agencies, Congress, the railroads, and, if necessary, the courts, the rights of our industry. We are determined on the establishment of a principle—the principle that in times of shortage of transportation each industry must bear its fair share of the burdens. We are increasing our executive staff, the better to carry on this work; we are arranging for a larger and better "Bulletin," as one means of publicity and an interchange of ideas with our members. We propose to adopt some of the methods of the National Coal Association—thereby the more efficiently to meet them at our next encounter. We propose to continue our campaign for membership until it includes every producer from one Portland to the other—from Minneapolis to New Orleans.

Members of the mineral aggregates industry: Organization can be just as big and powerful a force in your business as you see fit to make it. The National Association will foster and co-ordinate the activities of your state and local organizations. It will handle national problems and increase the efficiency of your operations. All that is needed is the loyal support of each of you and your hearty co-operation. As an industry we will be strong just in the proportion that we stand shoulder to shoulder and pledge our allegiance to our common cause, which we are convinced is just and deserving of prosperity.

Don't Forget the Big Louisville Convention

THE National Association of Sand and Gravel Producers will hold its next annual convention at Louisville, Ky., January 12, 13, 14, Hotel Seelbach. This is a month earlier than last year, but some big problems need early action. Everyone should be there. Make your reservations early.



Editorial Comment



Most of us thought the European war ended in November, 1918, with the signing of the armistice, but press dispatches from Washington the last day or two inform us that Congress is about to enact a declaration of peace, repealing the extraordinary war powers of the President and other special laws which have seriously handicapped the readjustment of industry in this country.

It is most unfortunate that the Esch-Cummins railway law does not fall in the category of war legislation, because certain features of it are as radical and as contrary to the spirit of our peace-time system of government as any of the special acts passed during the period of actual hostilities.

The Esch-Cummins railway law places in the hands of a commission of men of very mediocre business ability (judged by their records) the absolute power to decide at any time whether or not a public emergency exists and to act accordingly.

This law, as it is now written, gives the Interstate Commerce Commission the power to arbitrarily deprive this, that or the other industry of transportation facilities; in so many words, *of its right to live*.

The experience of the Interstate Commerce Commission in trying to live up to the task imposed upon it by the Esch-Cummins railway law is pathetic. Its members have harvested widespread condemnation and resentment which does not belong to *them*, but to the *clever business men* in the coal and railway industries, who either compelled or hoodwinked the Commission into exercising its great powers for *their profit*.

Real Reason for This Power

The rules and regulations governing the construction industry during the war period were severe in the extreme, and were imposed for the avowed purpose of restricting the industry to the narrowest possible margin of activity. The manufacturers of building materials became the under dogs, without an admitted right to live at all; but, like the good soldiers they are, they bore their burden cheerfully and without protest. Instead of relieving them of their war-time trials and tribulations the Esch-Cummins railway law has had the effect of prolonging these handicaps indefinitely.

Passed at a time when men's brains were full of ideas of great crises, the omnipotence of the Government over all the business activities of the nation, and the need of sacrifices by private citizens, it is probably excusable that our legislators should endeavor to meet and provide in a like manner for all future crises and emergencies, forgetting for the moment that previous to the year 1917 the business men of this country had

met these very same issues quite successfully without too officious Government aid.

High Time to Reconsider

But we are out of the woods now. Senator Harding's nearly unanimous election was a great deal more than the triumph of any political party. It was a tremendous endorsement of a *disciple of common sense*. It was a sweeping victory for the principle of: "More business in government and less government in business." The great mass of the people have come to realize that government meddling with the operation of the great universal laws of economics don't get us very far. We have had a good demonstration of that in Russia.

Consequently, as Congress meets to annul war-time legislation, let it not forget the Esch-Cummins railway law and those particular sections of it which have spelled the ruin of the construction industry this year of 1920. Let both congressmen and senators read this from the speech of Senator Edge on the submission of the preliminary report of the Calder committee to the Senate:

In a general way it looks to me as though revision or amendment of the Interstate Commerce Commission law might be necessary. At present, that body seems to have almost autocratic powers and to be virtually free from accountability to the executive or legislative branches. It apparently acts on its own initiative through ex parte orders on lines which were not contemplated in the theory on which it originally was constructed. Its present judicial powers might well be transferred to the courts, and its administrative powers to some agency to be established to take them over. * * * Production, transportation and distribution are the three chief points involved, and I think Congress can provide reasonable government supervision and the regulatory powers without government bureaucratic control or participation in private business, and with protection for the people, without oppression of any industry.

Let every single producer and shipper of building materials call the attention of his state's congressmen and senators to this glaring injustice to a huge body of useful, conscientious and law-abiding business men.

This week the editors of ROCK PRODUCTS have "covered" meetings of mineral aggregate producers in Indiana, Wisconsin, Iowa, Nebraska, Kansas and Missouri. At every one of these meetings one of the main subjects of discussion was the effect of the Esch-Cummins law on the construction industry in 1920. So powerful and widespread is the protest against such absolute power as that now held by the Interstate Commerce Commission that ROCK PRODUCTS confidently expects to see the revision of the Esch-Cummins railway law taken up by Congress before this issue is in the hands of all our readers.

**Righteous
Indignation**



Accident Prevention



Safe Use of Hoisting Apparatus

(Prepared for Rock Products by the Engineering Department of the National Safety Council)

THIS is the concluding article of series begun in October 23 issue of Rock Products.

Derricks

Under no condition should workmen be permitted to ride on loads being handled by derricks or on sling chains.

It is of vital importance that derricks rest on good foundation and be securely braced to prevent slipping. Great care should be taken to anchor the foot of the mast securely as there is a constant tendency for it to be pushed out of place, especially when the boom is near the horizontal. The top of the mast should also be securely held in place by guy-wires. At the end of the day or shift, or when work is stopped for a length of time, the boom should be lowered to the horizontal position or else raised to the vertical position so that there is no danger of its swinging in the wind or being meddled with by unauthorized persons.

The foundation of derricks should be inspected at frequent intervals to make sure that everything is in perfect working order and that the foot of the mast is not slipping. Wooden masts and booms should be frequently inspected for evidence of decay and rot. Sheave pins in the blocks should be frequently inspected because these are under excessive load and are apt to become badly worn within a short time. All pulley and sheave pins should be lubricated at regular and frequent intervals. The gudgeon pin and foot bearing should also be oiled occasionally.

A special hazard is introduced if the boom is longer than the mast, because when hoisting is being done with the boom near the vertical position the boom fall tends to pull the top goose-neck of a stiff-leg derrick or the spider of a guyed derrick off the gudgeon pin. If the mast is of wood a cotter pin should not be depended upon to hold the goose-neck or spider in place, because of the comparatively low shearing resistance of wood with the grain. Strong holding down guys or shrouds should be installed to hold the goose-neck or the spider at the top of the mast securely in place.

On construction work the importance of making sling hitches properly can hardly be overestimated. On high buildings, especially in thickly populated cities, should a sling break or the load become unhitched, serious results are almost sure to follow. Because so much depends upon

the condition of slings used for such purposes, particular care should be exercised in their selection and use. They should be inspected frequently and not permitted to lie about, but should be kept in order in a proper place.

A hold-back or guide rope is advisable on all loads that are liable to swing while being hoisted. This is especially necessary when hoisting unwieldy pieces, such as long beams. Hold-back lines should be held by intelligent workmen who should be under command of the chief hitcher.

Safety Work at Calumet and Arizona Mines

By C. L. Colburn, U. S. Bureau of Mines

THE CALUMET AND ARIZONA MINING CO. has established an efficient and progressive Department of Safety under the directions of Thomas Cowperthwaite, safety engineer. The Safety Department serves not only the Calumet and Arizona properties, but also associated companies namely, the Calumet & Arizona smelter at Douglas, Arizona; New Cornelia Copper Co., at Ajo, Arizona; Warren-Bisbee railroad running between Warren and Bisbee; the Tucson-Cornelia and Gila Bend railroad running between Gila and Ajo. During November 1916, the Gadsden Copper Company at Jerome, Arizona, started development work and this also was taken in charge by the same safety department.

The Calumet and Arizona Mining Co., operates four large mines at Bisbee, employing about 1,500 men underground and about 500 surface men during normal times. The smelter at Douglas employs about 800 men. The New Cornelia Copper Co. employs from 1,000 to 1,200 men during normal times and the Gadsden about 50.

Safety First Organization

The safety system requires that all superintendents, foremen, shift bosses and others who have charge of men to be members of the safety committee. This is done for two reasons: first because the man who has charge of a piece of work should make observations regarding the conditions under which his men work, and should compel his men to exercise a reasonable amount of care; second, it invites competition between those who have charge of men. The mines at Bisbee, the smelter at Douglas and the New Cornelia are always in competition with each other in safety matters. Their safety status is determined by figuring the yearly cost of accidents as compared to the pay roll. This method invites competi-

tion between the various superintendents who in turn require their foremen and shift bosses to use extra precautions to reduce their accidents to a minimum. At the New Cornelia copper mine, a committee composed of the heads of the various departments makes a trip around the plant and mine each month and reports the defects noted. This has proved very effective because each department head tries to find something wrong about his neighbor's department. All defects are reported to the Chief Inspector who investigates them and reports to the General Superintendent.

A bonus of \$30 is paid to the boss whose gang works 2,500 shifts without an accident requiring an employee to lay off. If a boss has 30 men he is credited with 50 shifts each day, therefore, it would take him 50 days to earn the bonus. A bonus of \$100 is paid to the foreman who has the best yearly record. These bonuses have considerable influence in strengthening the competitive system. Each department head works to get better results than his colleagues. The Mining Department pays the following bonus to the men: Any man employed who works one year without losing more than 30 days (except loss of time owing to serious sickness) receives a bonus of \$100 for the first year. The second year he receives \$110, the third year \$120, and so on until the bonus amounts to \$250. This is the largest amount paid.—Monthly reports of the U. S. Bureau of Mines.

Last Call for the 1921 Safety Calendar

THIS Calendar offers a splendid opportunity to round out safety instructions given to the man in the shop by carrying the message into his home, to his wife, and to his children, and through them, back to him.

SHIPMENTS will be made as promptly as possible, but we cannot provide against transportation delays which occur at this season.

National Safety Council
Co-operative—Non-commercial
168 N. Michigan Ave. Chicago, Ill.

New Machinery and Equipment

Boulder-Handling Device for Dredges

MARTIN SWINTEK, a practical sand and gravel operator of Eddyville, Iowa, has invented and put into operation a clever device for taking care of boulders in suction dredge operation.

This device is now being manufactured by the American Traveling Suction Screen Nozzle Co., Eddyville. Two of these nozzles are in use by Frank Cram & Sons, Des Moines, Iowa, who have made the following statement regarding its use:

"We are very much pleased with the traveling suction nozzle which we purchased and wish to advise the manufacturer that where we used to pump a car of sand in twenty to thirty minutes we now load the car in nine to ten minutes, with the traveling screen nozzle. We have never had to take a pipe down since installing this machine on account of slugs

or obstructions in the pipe line. We can highly recommend this machine as the most wonderful invention in the pumping of sand and gravel. We are now installing the second machine which we just received, on our other plant."

The essentials of the device are shown in the accompanying view of the Cram operation. The chain travels at a speed of only 24 ft. per min. and is driven either by a small electric motor or a gasoline engine.

This device also takes care of sticks, logs and other debris that may get in the way of the suction. In its present design no provision is made for recovering and crushing the boulders, the idea being to put them on a conveyor and drop them off the other end of the dredge, or, as in the operation illustrated, drop them into a hopper at the dredge end of the suction. However, it would be easy to add a conveyor and a crushing unit.

Acid Phosphate by a New Process

WHAT MAY PROVE to be a revolutionary development in the fertilizer industry of the world has been reached by the Bureau of Soils, United States Department of Agriculture, which claims to have solved the problem of extracting phosphoric acid from phosphate rock by heating mixtures of this material, sand and coke to a smelting temperature in a fuel-fed furnace.

The department turned its attention to the possibilities of using crude oil, the cheapest fuel obtainable in the vicinity of the large phosphate rock deposits of Florida. The efforts have recently met with success, and figures kept on the experimental runs indicate that phosphoric acid can be extracted more cheaply in an oil-burning furnace than by the old sulphuric acid process. The Cottrell electrical precipitator is used in the new process.



New device for clearing boulders, sticks, etc., from the suction end of a sand and gravel dredge

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:					
Buffalo, N. Y.	1.00	1.40 per net ton, all sizes	2.50	2.00	2.00
Burlington, Vt.	1.80	2.25	2.00	1.80	1.80
Califon, N. J.	1.50	1.50	1.50	1.50	1.50
Chaumont, N. Y.	1.80	1.80	1.80	1.65	2.00@2.25
Coldwater, N. Y.	1.45	2.50	2.40	2.00	1.60
Grove, Md.	1.25	1.25	1.25	1.25	1.25
North Leroy and Akron, N. Y.	1.35	1.35	1.85	1.85	1.85
Redington, Pa. (dolomite)	1.00	2.25	2.00	1.80	1.60
Utica, N. Y.	2.00	2.25	2.00	1.80	1.60
Vernoy, N. J.	1.00	1.50	1.45	1.45	1.45
CENTRAL:					
Alden, Ia.	1.00	1.50	1.45	1.45	1.45
Alton, Ill.	2.50	2.00	2.00	2.00	2.00
Bettendorf, Ia.	1.90	1.45	1.25	1.25	1.25
Buffalo, Ia.	1.58	1.90	1.70	1.58	1.58
Chicago, Ill.	2.00	2.00	2.00	2.00	2.00
Cincinnati, Ohio	2.15	2.40	2.20	1.90	1.90
Cleveland, Ohio	1.25	1.90	1.65	1.50	1.40
Columbia, Ill.	1.50*	1.50*	1.50*	1.50*	1.50*
Coralville, Ia.	1.00	1.50	1.35	1.25	1.20
Davenport, Ia.	1.30	1.30	1.30	1.30	1.30
Dundas, Ont.	1.60	1.90	1.90	1.80	1.60
Eden and Knowles, Wis.	1.25@1.50	1.50	1.25	1.25	1.25
El Wayne, Ind.	2.25	1.75	1.75	1.75	1.50
Greencastle, Ind.	1.60	2.00	1.25	1.20	1.10
Illinois, Southern	1.10	1.30	1.50	1.40	1.30
Kansas City, Mo.	1.80	1.25	1.40	1.30	1.30
Kokomo, Ind.	1.25	1.50	1.50	1.50	1.50
Krause or Columbia, Ill.	1.70	1.45	1.25	1.25	1.25
Lannon, Wis.	1.00	2.00	1.90	1.70	1.70
Lima, Ohio	.95@1.00	1.20	1.20	1.20	1.20
Linwood, Ia.	1.35@1.50	1.75@1.85	1.75@1.85	1.65@1.75	1.65@1.75
Mansfield, Ohio	2.00	2.25	2.25	1.75	1.75
Mayville, Wis.	1.25	1.50	1.50	1.25	1.25
Montrose, Ia.	.60	1.30	1.30	1.30	1.30
Oshkosh, Wis.	1.30	1.30	1.30	1.30	1.30
Ottawa or Hall, Can.	1.85	2.10	2.10	1.85	1.85
River Rouge, Mich.	1.75	2.40	2.40	2.15	2.15
St. Louis, Mo.	2.90*	3.25*	2.90*	2.90*	2.90*
Sheboygan, Wis.	2.50	2.50	2.50	2.50	2.50
Stolle, Ill. (I. C. R. R.)	1.50	1.75	1.75	1.75	1.75
Stone City, Ia.	1.00@1.25	3.50	3.50	3.50	3.50
Toledo, Ohio, f. o. b. cars	1.00	1.00	1.00	1.00	1.00
Toronto, Canada	1.85	2.00	2.00	1.70	1.60
Winnipeg, Can.	.65	1.75	1.75	1.60	1.60
SOUTHERN:					
Cartersville, Ga.	2.50	2.50	2.50	2.50	2.50
Chickamauga, Tenn.	1.50	1.75	1.75	1.75	1.75
Columbia, S. C.	1.00@1.25	3.50	3.50	3.50	3.50
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00
Fort Springs, W. Va.	1.85	2.00	2.00	1.70	1.60
Garnett, Okla.	.65	1.75	1.75	1.60	1.60
Mascot, Tenn.	1.50	2.00	2.00	1.50@2.00	1.50
New Braunfels, Tex.	.60	1.75	1.75	1.50	1.50
WESTERN:					
Atchison, Kans.	.50	2.10	2.10	2.10	2.10
Blue Springs and Wymore, Neb.	.20	1.95	1.85@1.90	1.75@1.80	1.70
Kansas City, Mo.	.60	2.00	2.00	1.50	1.50
Duluth, Minn.	1.00	2.25	2.00	1.50	1.50

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Bernardsville, N. J.	.80	2.20	2.00	1.80	1.50
Brantford, Conn.	.80	1.75	1.65	1.45	1.25
Birdsboro, Pa.	1.40	1.90	1.80	1.60	1.40
Bound Brook, N. J.	2.10	2.30	2.00	1.85	1.70
Dresser Ist., Wis.	.75	2.45	2.45	2.15	2.00
Duluth, Minn.	1.00	2.25	2.00	1.50	1.50
E. Summit, N. J.	2.10	2.35	2.15	1.85	1.80
Glen Mills and Rock Hill, Pa.	1.60	1.90	1.90	2.25	2.10
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60@1.00	1.60@1.80	1.60@1.80	1.40@1.50	1.20@1.30
Oakland, Calif.	1.15	1.15	1.15	1.15	1.15
San Diego, Calif.	.50@.70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55
Westfield, Mass.	.60	1.35	1.30	1.20	1.10
Winchester, Mass.	.85	.85	.85	2.10	1.85

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Dundas, Ont.—Flint	1.10	1.10	1.10	1.10	1.10
Henderson, Pa.—Quartzite	.90	.90	1.20	1.45	1.10
Holton and Bolingbroke, Ga.—Granite	.40	2.75	2.50	2.25	2.25
Little Falls, N. Y.—Syenite	.90	1.30	1.50	1.40	1.30
Middlebrook, Mo.—Granite	4.00	2.00	2.00	2.00	1.50†
Ottawa, Can.—Granite	5.50	5.00	5.00	5.00	5.00
Stockbridge, Ga.—Granite	.50	2.00	1.90	1.75	1.75
White Haven, Pa.—Sandstone	1.20	1.70	1.70	2.00	1.85

*Cubic yard. †Agril. lime. ‡R. R. ballast. §Flux. ¶Rip-rap. a 3-inch and less.

Agricultural Limestone

EASTERN:	
Coldwater, N. Y.—Analysis, 56.77% CaCo ₃ , 41.74% MgCo ₃ —70% thru 200-mesh, 95% thru 40-mesh; bags, \$5.00; bulk	3.25
Chaumont, N. Y.—Analysis: CaCo ₃ , 95%; MgCo ₃ , 1.14%—Thru 100 mesh; sacks, 4.50; bulk	2.75
Gasport, N. Y.—90% thru 50 mesh, bulk, 2.50; bags	4.25
Grove City, Pa.—Analysis: CaCo ₃ , 94.75%; MgCo ₃ , 1.20%—(70% thru 100 mesh); 80 lb. ppr., 5.50; bulk	4.50
Grove, Md.—(50% thru 50 mesh); paper bags, 6.50; bulk	4.50
Hillsville, Pa.—Analysis, CaCo ₃ , 96% (70% thru 100 mesh); sacks, 5.00; bulk	3.25
Jamesville, N. Y.—Analysis, CaCo ₃ , 89.25%; MgCo ₃ , 5.25%; bulk, 2.75; sacks	4.50
Syracuse, N. Y.—Analysis, 90% carbonates (50% thru 100 mesh, 90% thru 50 mesh); sacks, 3.50; bulk	2.75
Walford, Pa. (50% thru 100 mesh; 60% thru 50; 100% thru 10); sacked, 5.00; bulk	3.25
West Stockbridge, Mass.—Analysis: Combined carbonate, 95%—33% thru 200 mesh; 66% thru 100; 100% thru 40. Bulk	2.85
Williamsport, Pa.—Analysis, CaCo ₃ , 88-90%; MgCo ₃ , 3-4%—(50% thru 50 mesh); bulk	4.00@5.50
CENTRAL:	
Alden, Ia.—Analysis, CaCo ₃ , 99.16%	.80
Alton, Ill.—Analysis: CaCo ₃ , 96%; MgCo ₃ , 0.75%—50% thru 4 mesh	2.50
Bedford, Ind.—(95% thru 10 mesh) Analysis, CaCo ₃ , equivalent 98.5%	2.00
Belleville, Ont.—Analysis, CaCo ₃ , 90.9%; MgCo ₃ , 1.15% (45 to 50% thru 100 mesh; 61 to 70% thru 50 mesh); bulk	2.50
Chicago, Ill.—Analysis, CaCo ₃ , 53.63%; MgCo ₃ , 37.51%—90% thru 50 mesh	1.50
Columbia, Ill., near East St. Louis (¼-in. down)	1.25@1.80
Elmhurst, Ill.—(Analysis, CaCo ₃ , 35.73%; MgCo ₃ , 20.69%) 50% thru 50 mesh	1.25
Greencastle, Ind.—(Analysis, CaCo ₃ , 98%) 50% thru 50 mesh	2.00
Howenstein, O.—100% thru 10 mesh; 59% thru 50; 39% thru 100	2.75@3.00
Lannon, Wis.—(90% thru 50 mesh) Analysis, 54%, CaCo ₃ ; 44%, MgCo ₃	2.00
Marblehead, O.—(Analysis: CaCo ₃ , 95.33%) 100% thru 100 mesh, sacks, 5.25; bulk	3.00
Mayville, Wis.—CaCo ₃ , 53.65%; MgCo ₃ , 43.72%	1.75@2.00
McCook, Ill.—Analysis, CaCo ₃ , 54.10%; MgCo ₃ , 45.04%—100% thru ¼-in. sieve; 78.12% thru No. 10; 55.29% thru No. 20; 38.14% thru No. 30; 34.86% thru No. 50; 22% thru 100	1.50
Milwaukee, Ind.—(Analysis, CaCo ₃ , 94.41%; MgCo ₃ , 2.95%); 28% thru 100 mesh; 25.2% thru 200 mesh; 34.4% thru 50 mesh	1.65
Montrose, Ia.—(90% thru 100 mesh) Analysis, CaCo ₃ , 82.8%	1.25
Piqua, O.—Analysis: CaCo ₃ , 82.8%; MgCo ₃ , 8.2%; neutralizing power in terms of calcium carbonate, 95.3%—50% thru 100 mesh	3.50@5.50
50% thru 50 mesh	1.75@2.00
Ridgeville, Ind.—(Analysis, CaCo ₃ , 98%) 100% thru 4 mesh	1.75
River Rouge, Mich.—Analysis: CaCo ₃ , 54%; MgCo ₃ , 40%; bulk	.80@1.40
Stolle, Ill. (near East St. Louis on I. C. R. R.)—(Thru ¼-in. mesh) Analysis, CaCo ₃ , 89.61 to 89.91%; MgCo ₃ , 5.82%	2.75
St. Paul, Ind.—Analysis, CaCo ₃ , 85%; MgCo ₃ , 12%	1.50
Stone City, Ia.—Analysis, CaCo ₃ , 98% (50% thru 100 mesh)	.80
Toledo, O.—Analysis, CaCo ₃ , 52.72%; MgCo ₃ , 43%—(20% thru 100 mesh); 30% thru 50; 80% thru 100; 100% thru 5/32 screen	1.80
Whitehill, Ill.—Analysis, CaCo ₃ , 97.12%; MgCo ₃ , 2.50%—50% thru 100 mesh	5.00
50% thru 50 mesh	2.25

(Continued on next page.)

Agricultural Limestone

(Continued from preceding page.)

SOUTHERN:

Cartersville, Ga.—Analysis: 96% combined carbonates—90% thru 100 mesh	3.00
Claremont, Va. (Maritime)—Analysis, 90.94% CaCO ₃ , 0.31% P, 1.36% Mg, 0.37% K; bulk	4.50
100 lb. ppr. bags	6.00
100 lb. cloth bags	6.50
Dittlinger, Tex.—Analysis, CaCO ₃ , 99.09%; MgCO ₃ , .04%—90% thru 100 mesh	2.00
90% thru 4 mesh	1.00
Grovania, Ga.—Analysis, CaCO ₃ , 95%; MgCO ₃ , none—50% thru 100 mesh	3.00
Hopkinsville, Ky.—Analysis, 94.6 to 98.1% CaCO ₃ —Bulk	2.00
Knoxville, Tenn.—Pulverized	2.50
90% thru 100 mesh	3.00
Linnville Falls, N. C.—Analysis, CaCO ₃ , 53%; MgCO ₃ , 42%—50% thru 100 mesh; sacks, 4.50; bulk	3.00
Marion, Va.—Analysis, 90% CaCO ₃ —(50% thru 100 mesh)	2.50
Memphis Jct., Ky.—Analysis, CaCO ₃ , 95.31%; MgCO ₃ , 1.12%; average price, 1/2 in. down	2.00
Mascot, Tenn.—Analysis, CaCO ₃ , 52%; MgCO ₃ , 38%—(80% thru 100 mesh)	3.00
(All thru 10 mesh)	2.50
(80% thru 200 mesh)	5.00
Paper bags, \$1.50 extra per ton; burlap, 2.00 extra per ton	
Maxwell, Va.—Analysis, CaCO ₃ , 76.6%; MgCO ₃ , 22.83%—50% thru 100 mesh; 100 lb. ppr., 7.00; bulk	5.00
Ocala, Fla.—Analysis, CaCO ₃ , 98%—(75% thru 200 mesh)	4.50
Tyrone, Ky.—Analysis, CaCO ₃ , 90%; MgCO ₃ , 4%—90% thru 4 mesh	1.75@2.25

WESTERN:

Cement, Calif.—Analysis, CaCO ₃ , 95%; MgCO ₃ , 2%—(50% thru 50 mesh)	5.00
Colton, Calif.—Analysis: CaCO ₃ , 93%; MgCO ₃ , 1 1/2% (all to pass 14 mesh)—bulk, 3.50; bags	4.50
Sacks, 15c extra, returnable	
Kansas City, Mo., Corrigan Sidg—50% thru 50 mesh; bulk	2.00
Oro Grande, Calif.—Analysis: CaCO ₃ , 94%; MgCO ₃ , 2%—85% thru 200 mesh; \$4.00, bulk; bags	10.25
Terminus, Calif.—Analysis, 96.4% CaCO ₃ , 1.3% MgCO ₃ —(60% thru 200 mesh; 80% thru 100 mesh; 100% thru 50 mesh); sacks, 6.00; bulk	5.25
Tulsa, Okla.—90% thru 4 mesh	.65

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:

Berkeley Springs, W. Va.	3.00@3.50
Bridgeton, N. J.—Washed, 2.50; dried	3.00
Cedarville and South Vineland, N. J.—Damp, 2.00; dry	2.50
Columbus, Ohio	2.50@3.00
Gray Summit, Mo.	2.50@4.00
Hancock, Md.—Damp	2.00
Klondike and Pacific, Mo.	2.50@4.00
Leesburg, Pa.—Core, and molding coarse	3.00
Mapleton, Pa.—Dry	4.00
Glass, damp	3.00
Massillon, Ohio	3.50
Millington, Ill.	2.25@3.00
Mineral Ridge, Ohio	4.00
Montoursville, Pa.—Green, washed	2.00@2.75
Morgantown, W. Va.	3.00@3.25
Oregon, Ill.—Large contracts	2.00@2.50
Ottawa, Ill.	2.50
Pittsburgh, Pa.—Dry, 4.00; damp	3.00
Robinson, Md.—Washed, damp	2.00
Rockwood, Mich.	3.00@4.00
Round Top, Md.—Glass and damp, \$2.50; core	2.25
St. Marys, Pa.—Green	3.00
Sands, Elk Co., Pa.—Selected, green	2.75
Thayers, W. Va.—Washed	3.00
Tygart, Ky.—Washed, not dried	2.60
Utica, Ill.	1.75@2.50

FOUNDRY SAND:

Albany, N. Y.—Molding, fine and coarse	3.00
Brass molding	3.00
Core	1.65
Sand blast	3.00@5.00
Allentown, Pa.—Core	1.75@2.00
Molding coarse	1.75@2.00
Arenville, Ill.—Molding fine	1.75@2.00
Beach City, Ohio—Core	3.00@3.50
Furnace lining	3.50@4.00
Molding fine and coarse	3.00@3.50
Sand blast	3.50@4.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, 1/4 inch and less	Gravel, 1/2 inch and less	Gravel, 1 inch and less	Gravel, 1 1/2 inch and less	Gravel, 2 inch and less
EASTERN:						
Ambridge, South Heights, Pa.		1.30		1.30	1.00	1.00
Attica, N. Y.	.75	.75	.75	1.00	1.00	1.00
Eric, Pa.		1.00	1.15		1.25	
Farmingdale, N. J.	.48	.48			1.40	
Hartford, Conn.	.90		1.25	1.15	1.15	1.15
Leeds Junction, Me.	.60@.75	.75	2.00	1.75	1.65	1.50
Ludlow, Mass.	.75*		1.70		1.50*	
Pittsburgh, Pa.	1.30@1.50	.75			1.00	1.00
Washington, D. C.	.75	.75	2.00	1.40	1.20	1.20
York, Pa.	1.10@1.30		(crushed gravel)			
CENTRAL:						
Alton, Ill.	.60@.75	.75	1.50@4.50	1.30	1.20	1.20
Attica and Covington, Ind.	1.00	1.00	1.00	1.25	1.25	1.25
Anson, Wis.	.60@.75				1.00@1.15	
Barton, Wis.	.70	.70			.70	
Chicago, Ill.	1.75@2.23	1.15	1.75@2.43		2.00	
Cincinnati, O., and vicinity	1.20	1.15	1.15		1.15	.70
Columbus, O.	.70@1.25	1.10@1.25	.80@1.25	.80@1.25	1.75	1.75
Des Moines, Ia.	.75@1.00	.75	1.75	.85 (64/40)	.95	.95
Detroit, Mich.	.60	.70		1.05	.95	.95
Earlestad (Flint), Mich.	.20@.60	.50@.60	1.25@2.25		.90@1.10	
Eau Claire, Wis.	.75	.60	1.00	.84	.84	.84
Elkhart Lake, Wis.		.60		.90	.85	.85
Grand Rapids, Mich.	.80	.70	.80	1.00	.85	.80
Greenville, Mechanicsburg, O.	1.00	.85	1.90	1.90	1.90	1.90
Humboldt, Ia.	.60	.60		1.50	.75	.75
Indianapolis, Ind.	.80@.95	.80	1.30, drained for shipment	.85@.95		
Lincoln, Neb.	1.00	.80	1.85	1.85	1.75	1.75
Mason City, Ia.	1.00	1.55	1.60	1.60	1.60	1.60
Milwaukee, Wis.	.50	1.50	2.00	2.00	1.75	1.50
Minneapolis, Minn.	1.30	1.30	1.60	1.60	1.60	1.60
Moline, Ill.	1.30	1.30	1.30	1.00	1.00	1.00
Pittsburgh, Pa.		.85			.85@1.00	
Riton, Wis.	1.30	1.30	2.20	1.95	1.85	1.85
Saginaw, Mich., f. o. b. cars	1.95	1.65	1.85	1.65	1.60	1.60
St. Louis, Mo., f. o. b. cars	1.00	1.00	1.00	1.00	1.00	1.25
Summit Grove, Clinton, Ind.	1.00	1.00	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.75	.75				
Toledo, Ohio			All sizes	1.20		
Winnipeg, Can.						
Yorkville, Moronts, Oregon and Sheridan, Ill.	.90	.90	.90	.90	.85	
SOUTHERN:						
Flomaton, Ala.	2.00@2.25*	2.00@2.25*	2.75@3.00*	2.75@3.00*	2.75@3.00*	
Ft. Worth, Tex.	1.05	1.05	1.20@1.45	1.00	1.00	.95
Jedburg, Mo.	1.25	1.25	1.65	1.65	1.65	1.50
Knoxville, Tenn.		.75				
Lake Weir, Fla.		.75@1.00				
Macon, Ga.	1.40	1.40	1.50			1.50
Memphis, Tenn.		1.40				1.20
N. Martinsville, W. Va.	1.00		1.75		1.25	
New Orleans, La.	.90					
Pelzer, S. C.	1.25					
Pine Bluff, Ark.		.92				
Tulsa, Okla.	.70	.70				
Waco, Texas	.70@.80	.70@.80				1.10
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.	(Kaw River sand, car lots, 75 per ton, Missouri River, .85)					
Niles, Calif.	1.00	1.00	.90@1.10	.85@1.00	.85@1.00	.85@1.00
Porteau, B. C.	1.30	1.30	1.30			1.20
Pueblo, Colo.	2.00	1.75	1.75	1.75	1.75	1.75
Roseburg, Ore.	.80@1.00	.80@1.00	1.30@1.60	1.25@1.55	1.25@1.45	1.10@1.40
San Diego, Calif.	1.00	1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
San Francisco, Calif.	.60@.75	.60@.75	.60@.70	.60@.70	.60@.70	.60@.70
Saratoga, San Jose, Calif.	1.25	1.25	2.00	1.25	1.25	1.25
Seattle, Wash.		1.30*		1.30*		1.20*
Vancouver, B. C.						

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, 1/4 inch and less	Gravel, 1/2 inch and less	Gravel, 1 inch and less	Gravel, 1 1/2 inch and less	Gravel, 2 inch and less
EASTERN:						
Bonville, N. Y.	.60@.80		.55@.75			1.00
Clenville, N. Y.				1.00*		
Hartford, Conn.		1.00*				
Yardville, N. J.	.50@.75					
York, Pa.	1.00@1.30					
CENTRAL:						
Attica, Covington, Silverwood, Ind., and Palestine, Ill.	.85	.85	.85	.85	.85	.85
Cherokee, Hawarden, Ia.		.80 per ton—1.20 washed				
Elkhart Lake, Wis.	.70	.60	.60			
Ft. Jefferson, Mechanicsburg, O.	.60		.60	.60	.60	.85@.95
Hersey, Mich.		.65		.75		
Janesville, Wis.						
Oxford, Mich.		.75	1.30	1.30	1.30	1.30
Saginaw, Mich., f. o. b. cars	.65	.65	.65	.65	.65	1.75
St. Louis, Mo., f. o. b. cars						.65
Summit Grove, Ind.						
Yorkville, Oregon, Moronts and Sheridan, Ill.						.80@.90
SOUTHERN:						
Albany, Ga.	.70@1.00	1.15		1.10		
Dudley, Ky. (Crushed Sand)					.60	
Lindsay, Tex.					.60@.75	
Valde Rouge, La.		.80		1.50		1.30
Waco, Texas						
WESTERN:						
Roseburg, Ore.	1.75	1.50	1.75	1.50	1.50	1.50
Saratoga, San Jose, Calif.	.60@.75	.60@.70	.60@.70	.60@.70	.60@.70	.60@.70

* Cubic yard.

B Bank L Lake H Ballast.

Crushed Slag

City or shipping point	Roofing	1/4 inch down	1/2 inch and less	3/4 inch and less	1 1/2 inch and less	2 1/2 inch and less	3 inch and larger
EASTERN:							
Bethlehem and Emaus, Pa.	2.50	.90	1.50	1.20	1.20	1.20	1.20
Buffalo, N. Y.	2.35	1.25	1.25	1.25	1.00@1.25	1.25	1.25
E. Canaan, Conn.	3.50	1.10	2.50	1.35	1.25	1.25	1.25
Eastern Pennsylvania and Northern New Jersey	2.50	.90	1.50	1.10@1.25	1.10@1.25	1.10@1.25	1.10@1.25
Erie, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Hokendaugua and Donaghmore, Pa.	2.50	.90	1.50	1.20	1.20	1.20	1.20
Lebanon, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Sharpsville and Struthers, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Pennsylvania	2.50	1.25	1.25	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.	All sizes, \$1.50, F. O. B. Chicago						
Detroit, Mich.	All sizes, 1.65, F. O. B. Detroit						
Ironton, Jackson, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	2.20	1.70	1.95	1.95	1.95	1.70	1.70
Youngstown, Dover, Hubbard and Leetonia, O.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
SOUTHERN:							
Alabama City, Ala.	2.05	1.00	1.25	1.25	1.25	1.00	.95
Ensley, Ala.	2.05	1.00	1.25	1.25	1.25	1.00	.95
Longdale, Goshen, Glen Wilton and Low Moor, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05

Agricultural Lime and Hydrate

	—Agricultural Lime—		Per Cent	Per Cent	Agricultural
	Bulk	Bags	CaO	MgO	Hydrate
EASTERN:					
Adams, Mass.		7.50@8.00	98	18	
Bellefonte, Pa.	10.50		98.8	7.2	
Berkeley, R. I.		5.50	50	18	15.00
Branchton, Pa.		8.00			
Cassadaga, N. Y.—Maritime	8.00	10.00	92.36	1.08	
Avetown, Md.	8.50				
Cedar Hollow, Devault, Rambo and Swedeland, Pa.	10.50		45.50	30.50	13.00
Chippewa, Pa.	6.00@6.50		78.67	1.33	
Farnams, Mass.	6.50	8.00	60	2	
Frederick, Md.	7.75		38	5 to 8	10.50
Grove, Md.	8.00				10.75
Highgate Springs, Vt.	6.00		85	2	8.00
Hyndman, Pa.	5.00	8.50	80.23	2.87	
Lime Kiln, Md.	9.50	13.50			13.50
Lime Ridge, Pa.	5.25@6.50		80.56-62.56	3.87-1.75	
Mt. Union, Pa.	6.25		93.69		
Newburgh, N. Y.				38	8.00
New Castle, Pa.	3.50	4.50	47.6 to 50.4	0.62 to 1.12	
Paxtang and Lemoyne, Pa.	4.00@6.00		60	12	
Rosendale, N. Y.	8.00	9.00	92	5	
Union Bridge, Md.	11.00	5.50	73	1	13.00
Williamsport, Pa.	6.25	12.00	94.87	2-3	12.00
West Rutland, Vt.	5.00	8.00	68	3	
West Stockbridge, Mass.	3.35	5.35			12.00
York, Pa.	10.75	13.00	92	5	13.00
CENTRAL:					
Alton and Hannibal, Ill.	11.50		95		
Delaware, O.			50.0	5-12	11.50
Knowles and Valders, Wis.	4.00	9.00	55	45	13.00
Manistique, Mich.	11.00		95	2	11.00
Marblehead, O.					13.00
Mitchell, Ind.					13.50
Sheboygan, Wis.	5.50	8.50	58	40.5	
Woodville, Ohio			20	60	11.25
SOUTHERN:					
Blowers, Fla.	5.50		98		
Burns, Tenn.	10.00		96	0.54	14.00
Chippewa, Fla.	5.00		80.0	15.0	
Claremont, Va.	5.00	7.00	85-95	2-5	
Dittlinger, Texas		9.00@11.00	98.62	0.29	12.50@15.00
Erin, Tenn.	11.00		97.82	0.12	
Knoxville, Tenn.	12.00		98.5	.05	15.00
Lushing, Va.	9.00	11.25	60	15	12.75
Maxwell, Va.	6.50		84		6.50
Newala, Ala.	10.00		99.33		
Ocala, Fla.	4.00	6.00 pulv.	98 1/2	(dry basis)	
Staunton, Va.	9.00	11.50	80.00	15.00	
WESTERN:					
Colton, Calif.	15.00		97	2	
Kirtland, N. Mex.	12.00		97		
San Francisco, Calif.		15.00	97	0.33	15.00
Tehachapi, Cal.	6.00	8.00	96	2	

Miscellaneous Sands

(Continued from preceding page)

Bowmantown, Pa.—Core	1.35@1.50
Molding, coarse	1.80
Bridgeton, N. J.—Core	2.00
Cleveland, O.—Molding coarse	1.50@2.00
Brass molding	1.50@2.00
Molding fine	1.50@2.00
Core	1.25@1.50
Columbus, O.—Core	1.00@3.00
Brass molding	3.50@4.00
Glass sand	3.00
Molding fine and coarse	3.00
Conneaut, O.—Molding fine	2.25@2.50
Molding coarse	2.00@2.25
Delaware, N. J.—Molding fine	2.00
Molding, coarse	1.90
Brass Molding	2.15
Eau Claire, Wis.—Core	.70
Sand blast	3.00@4.25
Fleetwood, Pa.—Furnace lining	2.25
Franklin, Pa.—Traction	2.25
Brass molding	2.50
Core	3.00
Molding fine	3.00
Molding coarse	3.00
Sand blast	3.00
Greenville, Ill.—Molding coarse	2.00@2.25
Hancock, Md.—Core and brass mldg.	1.65
Hellam, Pa.—Core	2.00@2.50
Joplin, Mo.—Stone sawing, flint	1.25
Kansas City, Mo.—Missouri River core	.80
Klondike and Gray Summit, Mo.—Molding fine	2.00@3.00
Mapleton, Pa.—Core, furnace lining, molding fine and coarse damp	2.50
Core, furnace lining, moulding, fine and coarse, dry	3.00
Massillon, O.—Molding fine	4.00
Core and molding, coarse	3.50
Glass sand	4.00
Traction	3.50
Furnace lining	4.00
Michigan City, Ind.—Core, bank	.75

Millington, Ill.—Glass and core	2.25
Core sand	2.25
Furnace lining	2.25
Roofing sand	2.50
Stone sawing	2.25
Mineral Ridge, O.—Core, molding, sand blast, roofing, etc., washed, screened (damp)	2.25
Montoursville, Pa.—Core and traction	1.50@2.00
Brass molding	1.75@2.25
Glass sand	2.00@2.75
New Lexington, O.—Molding fine	4.25
Molding coarse	4.25
Oregon, Ill.—Core, furnace lining, molding fine and coarse	2.25@2.75
Sand blast	3.50
Ottawa, Ill.—Crude silica sand	1.25@1.75
Ottawa, Ill.—Core, furnace lining, steel molding	3.00
Glass sand	5.00
Roofing sand	2.50@3.00
Ridgeway, Pa.—Glass sand, green	2.25
Glass sand, wash	2.50
Molding, fine and coarse	1.20
St. Peter, Minn.—Glass sand	2.25
Core sand	2.25
Brass molding	2.25
Molding fine	2.25
Rockwood, Mich.—Glass sand, core, roofing, stone sawing	3.50@4.00
Sand blast	3.50@4.00
Thayer, Pa.—Traction	2.25
Furnace lining	1.40
Molding fine and coarse	1.25@1.50
Core, steel	2.50@3.00
Tygart, Ky.—Core and stone sawing	2.60
Fire-brick sand, washed but not dried	2.15@2.40
Utica, Pa.—Core	3.00
Molding fine	3.00
Molding coarse, traction	3.00
Brass molding	3.00
Warwick, Ohio—Core, furnace lining, molding fine and coarse (dry)	2.75
Same, green	2.50
Wedron, Ill.—Core (crude silica)	1.25
Molding fine	1.50
Furnace lining	1.50
West Albany, N. Y.—Molding fine	2.50
Molding coarse	2.50
Brass molding	2.50
Zanesville, Ohio—Molding fine and brass	2.50@3.00
Molding coarse	2.25@2.50

Crushed Gypsum

Castalia, O.—Crushed, to cement mills	4.50
Ft. Dodge, Ia.—Bulk	4.00
Grand Rapids, Mich.—Crushed gypsum rock	4.00
Gypsumville, Man., Can.—Crushed	3.50
Oakfield, N. Y.	4.00
Gypsum, O., and Akron, N. Y.	4.50@5.50
Saltville, Va.	4.50

(Gypsum) Land Plaster

Castalia, O.—Land plaster	6.90
Bags extra—Jute, 3.00; ppr., 1.00.	
Garhutt, N. Y.—Land plaster, bags extra	8.00
Grand Rapids, Mich.—Ground gypsum rock	5.00
Mound House, Nev.—Ground gypsum rock	7.50@8.00
Oakfield, N. Y.—Ground Gypsum rock	8.00
Plasterco, Tex.	12.00
Sandusky, O.	6.00
Jute, 3.00 extra; ppr., 1.00 extra.	
Los Angeles, Calif.	12.40@14.40

Ground Rock Phosphate

Centerville, Tenn.—B. P. L., 70%; ton, 2000 lbs. (90% thru 100 mesh)	9.00@10.00
Lump rock, 72% to 75%, B. P. L.	6.00@8.50
Centerville, Tenn.—B. P. L., 65%	9.00@10.00
B. P. L., 70%	9.00@10.00
Brown rock, 75% and better, thru 100 mesh—B. P. L., 60%	7.00@9.50
B. P. L., 65%	9.50
B. P. L., 70%	9.50
B. P. L., 72%	9.50
B. P. L., 75%	12.00
Lump rock, long ton, 65-70%	7.00@9.00
Mt. Pleasant, Tenn.—(B. P. L. 68%)	9.00@9.00
13% phosphorus	7.50@9.00
14% phosphorus	8.00
Mt. Pleasant, Tenn.—B. P. L., 65-70%	7.00@9.00
Norwills, Fla.—Fla. Hard Rock (B. P. L. 68%)	10.00
Wales, Tenn.—(B. P. L., 70%)	8.00

Florida Soft Phosphate

Bartow, Fla.—B. P. L., 60%, bulk	10.00
Croon, Fla.—Ground pebble, 30%	16.00
Pulverized soft, 26%	17.50
Jacksonville (Fla.) District	10.00@12.00
(Add 2.50 for sacks)	
Norwills, Fla.—B. P. L., 60%, bulk	10.00
Phoslime, Fla. (in burlap bags)	15.00

Portland Cement

Current warehouse prices, carload lots at principal cities, without bags:

New York (del.)	\$4.10
Jersey City (del.)	3.55
Boston	3.63
Chicago	2.35
Pittsburgh	2.42
Cleveland	2.73
Detroit	2.78
Indianapolis	2.61
Toledo	2.71
Milwaukee	2.59
Duluth	2.35
Peoria	2.63
Cedar Rapids	2.71
Davenport	2.67
St. Louis	3.45
San Francisco	3.00
New Orleans	3.50
Minneapolis	3.25
Denver	2.76
Kansas City	4.60
Seattle	3.12
Dallas	3.85
Atlanta	3.75
Cincinnati	3.32
Los Angeles	3.10
Baltimore (del.)	4.08
Montreal (including bags)	3.00
Detroit	3.52

NOTE—Bag charge is generally 25c each.

Natural Cement

Current price for 500 bbl. or over, f.o.b., exclusive of bags:

Minneapolis (Rosendale)	\$1.85
Kansas City (Ft. Scott)	1.60
New Orleans	3.36
Atlanta (Magnolia)	1.90
Cincinnati (Louisville)	2.85
Boston (Rosendale)	2.35

Roofing Slate

The following prices are per square (100 sq. ft.) for slate, f. o. b. cars, quarries, Bangor, Penn.

No. 1 Clear Slate	
Sizes	Price
24x14	10.85
24x12	10.85
22x12	11.55
22x11	11.55
20x12	11.55
20x10	12.60
18x12	11.90
18x10	12.60
18x9	12.60
16x12	11.90
16x10	12.60
16x9	12.60
14x10	12.60
14x8	11.90
14x7	11.20
12x10	11.20
12x8	11.20
12x7	11.20
10x8	9.10
10x7	9.10
10x6	9.10

No. 2 Clear	
24x12	8.75
22x11	8.75
20x10	9.45
18x10	9.45
18x9	9.45
16x8	9.10
14x10	9.10
14x8	9.10

No. 1 Odd Sizes	
18x18	13.30
16x16	13.30
14x14	13.30
12x12	13.30

The following are the prices per square for slate, f.o.b. cars, quarries, Granville, N. Y., the prices given in each case being for No. 1 Sea Green Roofing Slate:

22x11, 20x12, 20x11, 20x10, 18x12, 18x10, 18x9, 16x12, 16x10	11.90
24x12, 22x12, 16x9, 16x8, 14x12, 14x10	11.55
26x14, 24x14, 22x14, 20x14	11.20
14x9, 14x8, 12x10	10.50
14x7, 12x9, 12x8	9.80
12x7, 11x8, 11x7, 10x8	9.10
12x6, 10x7	8.40

Granulated slate per net ton, f. o. b.

quarries, Vermont and New York, 7.50@12.00.

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton	
	Finished	Common
New York	\$21.00	\$20.00
Kansas City	27.20	26.20
Chicago	27.00	21.00
St. Louis	27.00	21.00
Boston	28.00	27.00
Dallas	28.00	25.00
Cincinnati	17.60	17.60
San Francisco	27.50	22.00
Minneapolis	28.00	21.00
Denver	32.00	
Detroit	22.00	19.00
Seattle	30.00	
Los Angeles	2.75†	2.20†
Baltimore	23.50 (East)	
Montreal	25.00	25.00
Atlanta	24.50	24.50
New Orleans	24.50	24.50
Lump per 200-lb. Barrel		
Finished Common		
New York	\$ 3.80 at plant	\$ 3.60*
Kansas City	2.50	2.40
Chicago		1.65
St. Louis		2.75
Boston		3.95†
Dallas		2.50†
Cincinnati		2.10†
San Francisco		2.15
Minneapolis	2.10	1.80
Denver	1.05 (bu.)	
Detroit	2.00†	1.80†
Seattle	2.85†	
Los Angeles	2.75†	2.00†
Baltimore		13.00†
Montreal	15.00†	15.00†
Atlanta	3.00†	2.75†
New Orleans	3.00	2.85

* 300-lb. barrels. † Per 180-lb. barrel. ‡ Per ton. NOTE—Refund of 10c per barrel with 25c per ton off on hydrated.

Talc

Prices given are per ton f. o. b. (in carload lots only) producing plant, or nearest shipping point.

Baltimore, Md.—Crude talc	4.00
Cubex, per lb.	60.00
Blanks, per lb.	.08
Henry, Va.—Crude talc (lump mine run), per 2000-lb. ton	3.25@ 3.50
Ground talc (20-50 mesh), bags	8.75
Ground talc (150-200 mesh), bags	13.50
Chester, Vt.—Ground talc (150-200 mesh), bulk, 10.50@12.00; bags	12.00@14.00
Chatsworth, Ga.—Crude talc	8.00@10.00
Ground talc (150-200 mesh), bags	12.50
Pencils and steel workers' crayons, per gross	1.50@ 2.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@22.00
(Bags extra)	
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	8.50
(Bags extra)	
Ground talc (150-200 mesh), bulk, 10@15.00 and	10.00@15.00
(Bags extra)	
Pencils and steel workers' crayons, per gross	2.00
Biltmore, N. C.—Ground talc (150-200 mesh), 200-lb. bags	15.00@30.00
Pencils and steel workers' crayons, per gross, 1.25@1.45 and	1.55@ 1.60
School crayons, per gross	1.15@ 1.20
Roller mill crayons, per gross	1.75@ 1.90
Keeler, Calif.—Ground talc (150-200 mesh), bags	18.00@40.00
(Bags extra)	
Gouverneur, N. Y.—Crude talc	4.00@ 5.50
Ground talc (150-200 mesh)	20.00@28.00
Johnson, Vt.—Ground talc (20-50 mesh), bulk	8.50
Bags	10.00
Ground talc (150-200 mesh), bulk	10.00
Bags	21.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Michigan City, Ind.	14.00@15.00
Milwaukee, Wis. (delivered at job)	18.50
Barton, Wis.	15.00
South Dayton, Ohio	16.00
Albany, Ga.	16.00
Brighton, N. Y.	20.50

Buffalo, N. Y.	16.50
Winnipeg, Can. (less \$1 trade disc.)	19.00
Boston, Mass.	19.00@21.00
Syracuse, N. Y. (delivered at job)	27.00
F. o. b. cars, plant	23.00
Washington, D. C.	15.50
Portage, Wis.	30.00
San Antonio, Texas—Common	19.00@22.00
Face	30.00@35.00
Boise, Idaho (in yard)	18.00
El Paso, Texas	16.00
Rochester, Mich.	13.00
Bloomfield, Ont., Can.	18.00
Plant City, Fla.	17.00

Chicago Dealer Cuts Prices

ON DECEMBER 4 the Wisconsin Lime and Cement Co., one of the largest building supply firms in Chicago, announced the following cuts in prices of building materials:

The average cut was somewhere between 20 and 25 per cent. Many other material firms followed suit, and there will apparently be a general readjustment to the news levels in all the city yards.

Here are some of the changes:

	Old price	New price	Pct. dec.
Wooden lath, per M.	\$20-\$22	\$ 9-\$12	50
Plaster, ton	22-23	20	11
Sand, stone, and gravel, cu. yd.	4.25	3.50	17.6
Hollow clay partition tile, per 1,000 sq. ft.:			
3-in.	150	110	27
4-in.	160	120	25
6-in.	220	165	25
8-in.	300	225	25
Fire clay, ton	12-25	9-18	27
Bricklayers' cement, bbl.	3.55	3.20	10
Roll roofing, roll	4.00	2.50	37.5
Asphalt individual shingles	9.00	6.50	28
Strip shingles	7.10	5.10	28
Wall boards, per 1,000 ft.—\$3 to \$5 off.			
Metal lath, per sq. yd.—Reduced 3 cents to 5 cents, a flat 10 per cent cut.			
Coping—Horizontal cut of 10 per cent.			
Flue lining—Average cut of 10 per cent.			
Lime—A cut of 10 per cent.			

Made by Dealers—Not Manufacturers

In most instances these reductions are made directly by the dealers without any change in price by the manufacturers. In others they exceed cuts made by the producers, as in the case of roofing, the manufacturers of which recently started the downward movement by a slash of about 25 per cent. In the case of wooden laths, there has been a drop in the market, but the dealers declare that much of the stock which they will close out for \$9 to \$12 cost them \$16.

Cement is now down to \$2.25 a barrel, net, Chicago, the reduction made by three companies Thursday bringing their prices down to that of Universal.

"The object," said one leading dealer, "is to aid in bringing things down to new commodity levels. The crying demand of the consumers is that everything get down to a stabilized level, and we are trying to meet it. In some things the dealers are cutting below profits, closing out at losses in the hope that in replacements some manufacturers will also make a cut. We think the new quotations go to the bottom. We believe it will stimulate building. We think the dealers have done their share and if the bankers now do not release some money they can't holler at the building material men for not taking a swat at prices."—(From the Chicago "Tribune.")

Portland Cement Prices Drop in Eastern Markets

Amount of Work to Develop in 1921 Still in Some Doubt

BUILDING INVESTORS shaping their construction programs for next year upon price changing stipulations were encouraged last week by the announcement of a 30-cent drop in the price of portland cement, says the Dow Service Daily Building Reports.

The delivered price for this commodity at the week end was \$4.80 as against \$5.10 a barrel, representing both a dealers' and manufacturers' cut. The manufacturer cut his price 20 cents because manufacturers in the Mid-Western section of the country lowered their price from \$2.50 f.o.b. mill to \$1.98 a barrel. The change in the price of soft coal was ascribed as the reason for this cut in the Middle West.

While the soft coal situation has been easing up for some time there were cement authorities who believed that the cut in the price of cement here, while in part due to the more favorable situation with respect to fuel supply, was in reality an attempt on the part of Eastern manufacturers to check the flow of Mid-Western cement into the Eastern territory. As for the dealers' cut, the slackening off in demand for building materials of all kinds was ascribed as the reason for the additional reduction totaling 30 cents with the usual rebate of 25 cents a bag, four bags to the barrel for empty cotton containers.

The fact that price reactions in some lines have taken place while other lines have held firm in spite of pressure and that certain building material manufacturers are becoming more willing to accept orders to carry over the first quarter of 1921 are combining to bring out work in architects' offices that has been lying dormant for some time in anticipation that the waiting tactics would finally wear down the price supporters.

A slight change has therefore been noticed in the building material and distributing centers supplying the New York building construction industry. It is not sufficiently sustained by contract award, however, to justify anyone in believing that it foretells the character or quantity of construction that will develop in 1921. The fact that some of these projects, perhaps a slight majority of them, concern dwelling construction, either of the suburban type of large multi-family structures, like tenements or apartments, might lead to the assumption that next year's construction market would strongly tend in that direction, were it not for the fact that contract awards are not yet sustaining the inquiries in sufficient number to

make the situation sufficiently general to be considered barometrical.

The upset condition in general business, for example, has had a tendency to check commercial construction projects in favor of housing and work of such character, such as institutional building construction. There is also, probably for the same reason, a disposition to defer industrial expansion.

It is generally possible at this time of the year to trace the probable course and character of construction for the ensuing nine months, but present indications suggest a timid advance into 1921 construction of all kinds covering a period well into February. March and April, when the building season can be considered to be definitely under way, may be expected to come and go before the true character of next year's construction program can be reliably determined.

Building material prices, therefore, may be expected to work to more favorable levels, as far as the consumer is concerned, thus encouraging an increasing volume of moderate priced building work. In the meantime winter weather conditions will affect manufacturing costs, reserve stocks and transportation so that as the building demand becomes stronger as the year advances price stiffening may be looked for, reaching a peak perhaps toward mid-summer or early autumn, when building material producers will have had an opportunity to approximate the proportion of the three to four-year building construction back-log that is to come out in 1921-22.

The report of the U. S. Senate Committee on Reconstruction and Industry, of which Senator Wm. M. Calder is chairman, will be issued early next week, and it is expected that the findings it will reveal will tend to put the public in a much more anticipatory mood with regard to lower building material prices. This, coupled with the other investigations called to study into the housing situation, is expected to have a tendency to make the prospective builder cautious.

What Coal Priority Did to Illinois Road Building

INSTEAD of building 1800 miles of road as originally planned for the year, the state found it impossible to complete even the 400 miles of contracts left over from 1919 and the 50 miles of new contracts awarded, although every pound of building material that could be secured was used.—Chicago "Tribune."

Kiln Brick Prices Reduced

PITTSBURGH.—Partly in keeping with the decline in iron and steel prices, but to a large degree influenced by a marked falling away in the demand and because of lower producing costs, manufacturers of fire clay and silica brick in all districts have made a horizontal cut of \$5 per 1000 in prices, says "Iron Age." Iron and steel plant activities, barring the United States Steel Corporation, have been on a steadily declining scale for several weeks and this condition has been attended by some rather heavy cancellations, particularly of requirement contracts. Although cancellations and suspensions have not been as heavy in the past week or so as they were previously, they still are coming in and order books of a number of producers now are rather slim. This condition, however, is being met by curtailment of production, for while costs have come down with practically all manufacturers, they still are too high for the stocking of brick against a future revival in the demand.

Manufacturers of fire clay and silica brick have been aided materially in cutting producing costs by the big slump of the past few weeks in the coal market. This development has an important bearing on silica brick prices, for the reason that few plants producing this class of brick are located near coal mines and thus have the price advantage of a short haul. Current prices for coal have put a good many high-costing coal operations out of business and made impossible the maintenance of the recent high wages that were being paid to miners. This has effectually stopped the exodus of men from the clay to the coal mines and once more made possible a full supply of men for the clay mines.

Besides, the passing of the shortage of cars has made it unnecessary for the brick makers to tie up large sums in the carrying of stocks that could not be moved out.

Indications are that the price reduction just announced will be followed by others. Demands at the new prices are moderate in the extreme, while there is a dearth of new blast or open hearth furnace or by-product coke plant construction, and iron and steel companies appear to have plenty of brick to meet the requirements of repair work. Prices of magnesite and chrome brick have been cut \$10 per net ton.

We quote per 1,000 f.o.b. works:			
Fire Clay:	High Duty	Moderate Duty	
Pennsylvania	\$45.00 to \$55.00	\$40.00 to \$45.00	
Ohio	42.00 to 50.00	35.00 to 40.00	
Kentucky	45.00 to 50.00	40.00 to 45.00	
Illinois	45.00 to 55.00	35.00 to 45.00	
Missouri	55.00 to 60.00	40.00 to 50.00	
Silica Brick:			
Pennsylvania		\$50.00 to \$55.00	
Chicago		60.00	
Birmingham		50.00 to 55.00	
Magnesite Brick:			
Standard size, per net ton.....			100.00
Chrome Brick:			
Standard size, per net ton.....		80.00 to 90.00	
Bauxite Brick:			
55 per cent per net ton.....			50.00
76 per cent per net ton.....			90.00



General Market News



Central West Lime Men Decide on Promotional Work

AT A MEETING held in St. Louis, Mo., December 9, the members of the National Lime Association in the districts embracing the Mississippi and Missouri Valleys, decided to have a special assessment of 2 cents per ton to maintain a local office at St. Louis with a salaried field representative.

It was the unanimous opinion of this meeting that it was against the best interests of the lime industry to sell chemical lime on a basis depending on chemical analyses at the point of delivery. The buyers' analyses should in all cases be made at the producing plant, for the lime manufacturer could not rightfully be held responsible for deterioration of the lime in transit and while it is held awaiting the buyers' acceptance. A resolution to this effect was passed.

The executive committee of the local group was increased to five members and given full power to employ a competent field man at once. The executive committee is comprised of Col. C. W. S. Cobb, Glencoe Lime and Cement Co., St. Louis, Mo.; B. L. McNulty, Mitchell Lime Co., Chicago, Ill.; J. F. Pollock, Ash Grove Lime and Portland Cement Co., Kansas City, Mo.; T. P. Black, Black White Lime Co., Quincy, Ill., and George Weigart, Arkansas Lime Co., Ruddells, Ark.

New Wisconsin Agricultural Limestone Producer

THE TREMPLEAU LIME PRODUCTS CO., Trempealeau, Wis., has recently entered into a contract for the entire output of its new plant for crushing and pulverizing limestone. The company has also arranged to increase its capital by \$50,000 to add equipment and facilities.

G. G. Gibbs is president of the new company, A. A. Holmes, vice-president, and L. S. Sanders, secretary and treasurer. Mr. Sanders writes: "We have had our product certified by the University of Wisconsin Soils Department, which tells us that we have one of the best grades of pulverized limestone in the state. At the present time we have signed orders through an independent sales organization for nearly one year's output of the plant on a 100 ton a day capacity. We will specialize on pulverized limestone and chicken grit almost exclusively. We would like to get in touch with the various machinery firms and also, if possible, with a first class superintendent.

Ohio Macadam Association Convention at Columbus

THE annual meeting of the Ohio Macadam Association will be held in Columbus, Ohio, Jan. 18 and 19. Headquarters will be maintained at the Deshler Hotel, where a banquet will be given on the evening of Jan. 18. A bigger, better program than ever is promised for this year, in spite of all previous records.

Three Million Italian Laborers Anxious to Come to United States

ACCORDING to a special dispatch to the Chicago "Tribune" from its Milan, Italy, correspondent, John Clayton, three million Italians are awaiting visas and transportation to America. United States consulates throughout the country are overwhelmed with work and the long lines of those desiring to purchase steamer tickets stretch for blocks outside the principal agencies on days when steerage and third class tickets are put on sale.

In relation to the population the greatest number of these are from Sicily. The consulate at Palermo is handling several hundred applications daily. Many more would apply but for a ruling that steamer reservations must be made before visas will be granted. The great bulk of the Italian emigration is from the South.

Mostly Unskilled Laborers

Practically 90 per cent of those desiring to sail for America are agricultural laborers. The consulates which handle most of the applications from the north of Italy—Milan and Turin—are averaging about 50 applications a day. Genoa handles another 50 daily and Florence slightly less.

Only a small proportion of these prospective Americans are industrial workers, despite the fact that they come from the great Italian industrial centers. There seems little prospect that the steamship lines will be able to transport more than one-third of the traffic which is offered them for the coming year.

Since January 1, 1920, they have transported approximately 500,000 Italians, most of whom went to the United States, other emigration being to South America, Africa and Europe. All steamship accommodations have been reserved from now until the late spring. Accordingly the consulates will refuse visas until such time as further reservations are possible.

As this issue of Rock Products goes to press it seems likely that Congress will prohibit all immigration for two years.

Wisconsin Granite Co. Expanding

THE WISCONSIN GRANITE CO., with main offices at Chicago, Ill., and quarries and crushing plants at Berlin, Utley, Waupaca, Ableman, Montello, Red Granite, Grand Rapids and Amberg, all in Wisconsin, Sioux Falls and Dell Rapids, S. D.; Chicago, Ill., and Alexandria Bay, N. Y., has recently purchased the entire quarrying interests of Jos. Leopold and Co., at Alexandria Bay, N. Y., which will be reopened and operated in the future as a granite paving block quarry in addition to the rock crushing plant which the Wisconsin Granite Co. now has on the adjoining property.

The Wisconsin Granite Co. has also begun the erection of a new crushing plant in Chicago, which will be completed early in the spring, and will add largely to this company's line of fine crushed stone of various colors, for stucco and other purposes.

Also, an addition to the Dell Rapids, S. D., plant will be made this winter to increase the output of fine crushed stone, and will also be in readiness for Spring trade.

United States Bureau of Standards Needs More Money

WASHINGTON, D. C.—More than a quarter of a million dollars are sought by the Bureau of Standards for its work in connection with investigations of interest to the rock industry during the fiscal year beginning July 1, next, according to estimates which have just been submitted to Congress.

An increase of \$50,000 over the current appropriation is sought for the fund for testing structural materials such as clay, stone, cement, etc., and Congress has been asked to set aside \$175,000 for that purpose.

Fifty thousand dollars are sought for investigations of fire resisting properties of building materials, an increase of \$25,000 over the current appropriation for this work.

An increase of \$10,000, making a total fund of \$35,000, is asked for study of methods of measurement and technical processes used in the manufacture of brick, tile, etc.

The sum of \$250,000 is asked for technical investigations in co-operation with the industries upon fundamental problems involved in industrial development following the war, with a view to assisting in the permanent establishment of new American industries.



News of the Industry



Incorporations

The Hermitage Mining and Development Co., Minneapolis, Minn., has been incorporated for \$500,000.

The Lippi Mfg. Co., Brooklyn, N. Y., has been incorporated for \$10,000 to deal in cement by M. Herbert and C. Lippi, 2091 Nostrand Ave., Brooklyn.

The Kulper-Bertschery Co., Hillside, N. J., has been incorporated for \$50,000 to deal in building supplies by Michael and John Kulper and Ed. Bertschery.

The Elliston Washed Sand and Gravel Co., Indianapolis, Ind., has been incorporated for \$150,000 by Palmer Boles, Marion Dugger and L. Ray Henley.

The Iron Trap Rock Co., Woonsocket, Mass., has been incorporated for \$150,000 by J. F. Letendre, J. C. Cheiron and C. J. Letendre, all of Woonsocket.

The Composite Tile and Brick Co., Manhattan, N. Y., has been incorporated for \$400,000 by A. Girtanner, A. G. Wilson and J. H. Gross. The offices are at 347 5th Ave.

The Sand and Gravel Co., Boston, Mass., has been incorporated for \$3,000 by Chas. M. Cornell, 50 Highland Ave., and Somerville, Mass., and Wm. J. Lyons and E. L. Callahan.

T. O. Ranch Co., Duluth, Minn., has been incorporated for \$100,000 to manufacture marble, stone, brick and other building materials by A. D. Thompson of Duluth and A. J. Meloche of Raton, New Mexico.

The Juneau Lumber Co., Juneau, Wis., has been incorporated for \$20,000 to retail lumber, cement, tile, sand and other building materials. The incorporators are J. J. Adams, A. B. Roensberry and B. E. Smith, all of Wausau, Wis.

The Waupaca Concrete Products Co., Waupaca, Wis., has been incorporated for \$30,000 to engage in retailing and wholesaling of sand, gravel and other building materials. The incorporators are Wm. E. Hanson, A. E. Woody and C. C. Woody.

The Barefoot Produce Co., Cowan, Ind., has been incorporated for \$50,000 to handle general building supplies and coal. The directors of the company are E. L. Barefoot, H. Barefoot, H. C. Kuhner, C. D. Barefoot, James Barefoot and Frank Bernard.

The Helm-Lewis Cement Block Co., Indianapolis, Ind., has filed articles of incorporation for the purpose of dealing in cement blocks and similar cement products. The company is capitalized at \$10,000 and the directors are C. A. Helm, E. L. Selvaige, L. W. Lewis and T. R. Lewis.

The Oak Hurst Lime Co., Ocala, Fla., has been incorporated for \$20,000 to manufacture building, agricultural and chemical lime, road materials and any such forms of lime and by-products of lime, by John M. Meffert, Pres.; C. G. Fraser, Vice-Pres. and Gen. Mgr.; Wellington H. Meffert, Sec. and Treas.

Quarries

The Ohio Marl Co., 803 Commercial Bldg., Dayton, O., are opening up a large deposit of marl at Spring Valley, O., and are seeking data on a strictly modern and up-to-date plant for handling the same.

The Blue Ridge Talc Co., Henry, Va., has just contracted for the installation of a Raymond pulverizer and will purchase a gasoline locomotive for hauling mine run rock from mine to mill, a distance of $\frac{3}{4}$ mile. They are also going to discard 4-yd. side dump cars in favor of all steel rocker type "V" cars for handling this material. These changes will be made during the present slack order period to be ready for early spring resumption of normal market conditions, which we feel sure will not be long in returning.

Cement

The Atlas Portland Cement Co., Northampton, Pa., is arranging for an increase of its capital

from \$14,000,000 to \$23,000,000. The firm is understood to be planning for the construction of a new mill, and bids for a number of buildings will probably be asked at an early date.

The Ash Grove Lime and Portland Cement Co., Ash Grove, Mo., has decided to make many improvements on the plant. A machine shop will be built and two large rock crushers purchased for use in the quarry. A force of men is already engaged in laying a spur track to the quarries from the hydration mill, a third rail being laid so that standard gauge cars may be run over the line.

The Lehigh Portland Cement Co., Allentown, Pa., has plans under way for the construction of a new branch plant in the vicinity of Birmingham, Ala. It has acquired a site of about 230 acres at Tarrant City, in this district, offering fine terminal and distributing facilities. The plant and equipment is estimated to cost \$2,000,000, with an annual capacity of close to 1,000,000 barrels of cement.

The Lehigh Portland Cement Co., Iola, Kansas, just recently completed some storage bins for the finished product of the plant and the great concrete cylinders look like a terminal elevator for grain storage. This was only a part of the re-building program planned. Just now they are busy getting out rock for a 3,000 cubic feet job of concrete that will, when completed, give the plant concrete construction throughout with the possible exception of the sacking room. All the rock storage bins will be of concrete and all the old frame storage buildings will be rebuilt of concrete.

The Phoenix Portland Cement Co., Nazareth, Pa., is constructing at its Nazareth, Pa., plant a large transformer house to take care of additional power, which will be required to operate the large compartment type mills, which are now being installed in their cement grinding department. Last year this company redesigned and reconstructed their entire raw grinding department and coal mill, which has proven very efficient in every respect, decreasing the amount of labor required to operate their plant. Last January a locomotive crane was installed to unload and handle the coal to the coal mill. Upon the performance of this crane, another locomotive type crane electrically operated has recently been placed in operation. It is one of the largest cranes in use at any plant in the Lehigh Valley, being operated on a 16-foot gauge track and having a boom of 85-foot swing, with three-yard clamshell bucket which will be used in the handling and storage of crushed cement rock. All improvements at this plant were designed and erected under the personal direction of Howard H. Leh, the company's general superintendent.



E. L. Sanborn

Gypsum Products

The Valmont Plaster Co., Otton, N. M., now has its plant in operation at Valmont, ten miles below Alamogordo. They manufacture a grade of interior plaster that is said to be of a high grade quality. The Valmont company announces that there are now men interested in the concern and the distribution of its product who are abundantly able financially and with distribution experience sufficient to assure that the company's business will be successful. The machinery and calcining parts of the plant are along the best modern lines, and as the business and the demand for the product grows other units can be added.

The Wheeling Wall Plaster Co., Wheeling, W. Va., has increased their capitalization to \$250,000. This increase is to provide capital for enlarged operations and increased building and road construction. The company is now producing, as well as marketing, a number of building supplies, such as sand, gravel, roofing and wall plaster. By producing the greater part of their supplies, the company will be better equipped to serve their customers with greater efficiency and first quality at all times. The tow boat "Sand Boy," recently constructed by the company at a cost of over \$20,000, is said to be one of the best and fastest tow boats plying the Ohio.

Lime

The Limestone Products Corporation of America, whose plant will be located at Newton, N. J., are making rapid progress in the construction of their crushing plant for furnace stone and the grinding unit for the manufacture of agricultural lime is also under construction. The stone at Newton is a very high grade crystalline limestone. The designs of the plant were made under the direction of Howard H. Leh, Nazareth, Pa., the company's consulting engineer. Edward S. Bixler, of Newton, formerly of Easton, Pa., is at the head of this company.

Personals

James Frame, formerly of Jamestown, R. I., is now located at Room 607, 53 State St., Boston, Mass., as an engineer specializing in mining and geology.

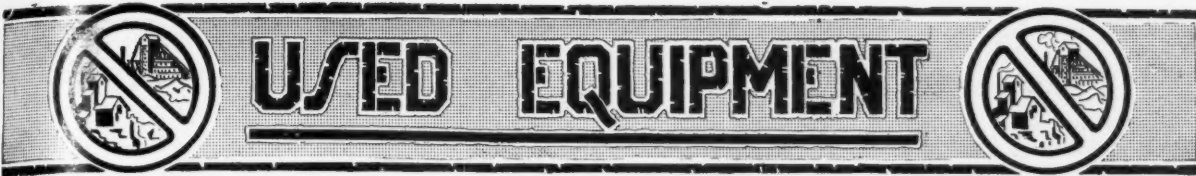
Chas. T. Topping, formerly of the Chas. T. Topping Machinery Co., Pittsburgh, Pa., dealers in contractors' equipment, who has been associated with the Lakewood Engineering Co., Cleveland and New York, the past two years, resigned recently to re-engage in the construction machinery business for himself. He has established his organization in the House Bldg., Pittsburgh, and will act as district sales representative for the Austin Machinery Corp., Chicago, manufacturers of concrete mixing, excavating, road building and material handling machinery and equipment.

E. L. Sanborn, formerly an engineer in the employ of the Worthington Pump and Machinery Corp., Power and Mining Co. division has been announced as Chicago district manager, succeeding O. E. Thaley, who is now general manager of F. C. Peck and Sons Co., Kansas City, Mo., producers of washed sand and gravel. Mr. Sanborn before coming to the Worthington Pump and Machinery Corp. was chief engineer for the Smith Engineering Co., of Milwaukee, Wis., for a period of 5 years. He was one of the engineers that designed the Columbia Chemical Co. crushing plant at Zanesville, O., reputed to be the most modern crushing plant in the country.

OBITUARY

Elmer E. Cross, one of the organizers and a former president of the Kaw River Sand and Material Co., of Kansas City, Mo., died at Excelsior Springs, Mo., on Nov. 29. He had not been connected with the company since 1914.

John Finsley Jeter, E. M., who was for many years connected with the Vulcan Iron Works of Wilkes-Barre, Pa., as engineer in charge of cement, chemical and metallurgical machinery, died on Oct. 16 after a brief illness.



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No. 4 Telsmith plant, A. C. motor drive.
Air compressors (steam belt) 50 to 4,000 ft.
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Bucyrus shovel, 65-ton, 2 1/2 yd., mounted on railroad trucks (bargain).
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3 steel trailers, 5 yd.
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2 derricks (guy and stiff leg).
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I own the above, will sell, or rent to responsible party.

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18 inch Symons disc crusher.

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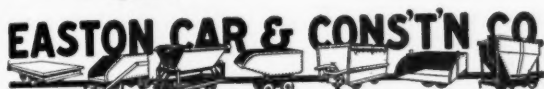


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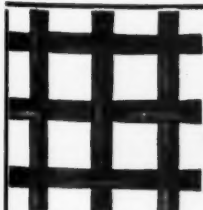
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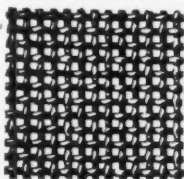
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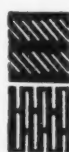
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TIMBER & STEEL DERRICKS.

LET US SOLVE YOUR MATERIAL HANDLING PROBLEMS.

Steel and Timber DERRICKS TERRY

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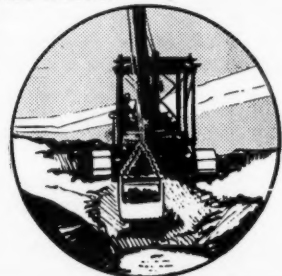
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dig, convey, elevate and dump in one operation

If you wish to know what type of equipment gives the greatest all-around satisfaction as an excavator and conveyor of sand and gravel, we suggest that you visit the nearest user of a Sauerman Dragline Cableway Excavator and you will receive your answer.

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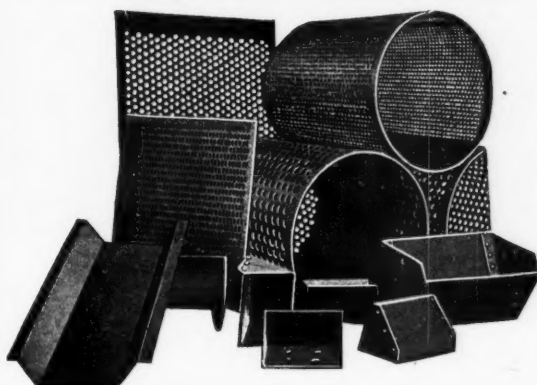
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Also manufacturers of
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Perforated Metal Screens FOR Stone, Gravel, Sand, Etc.



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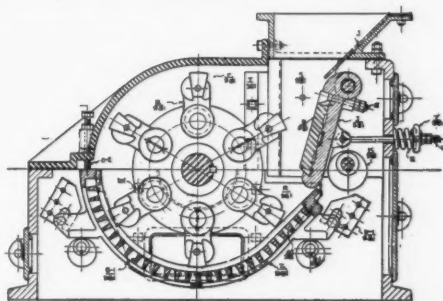
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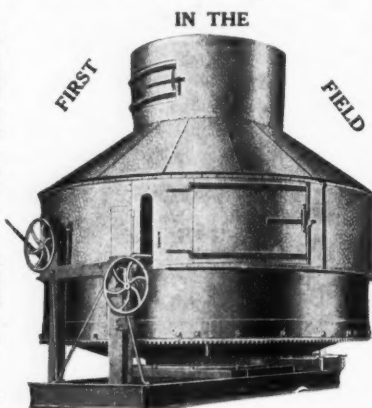
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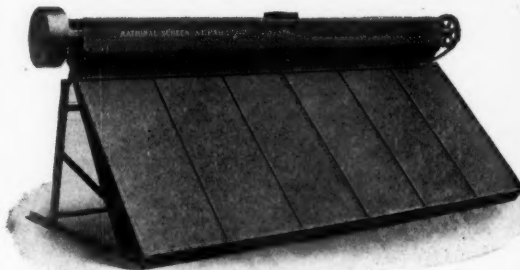
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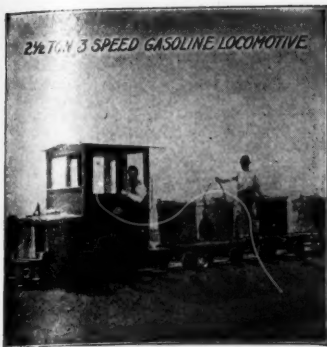
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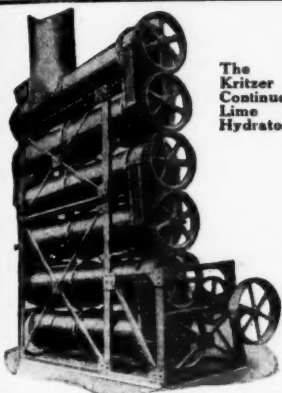
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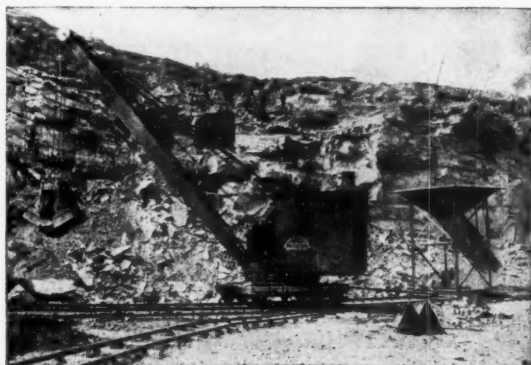
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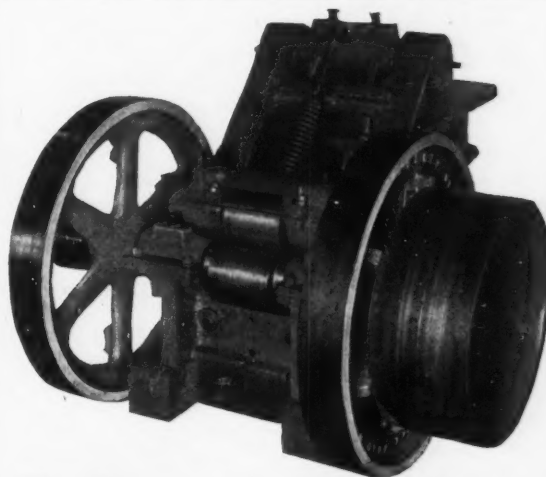
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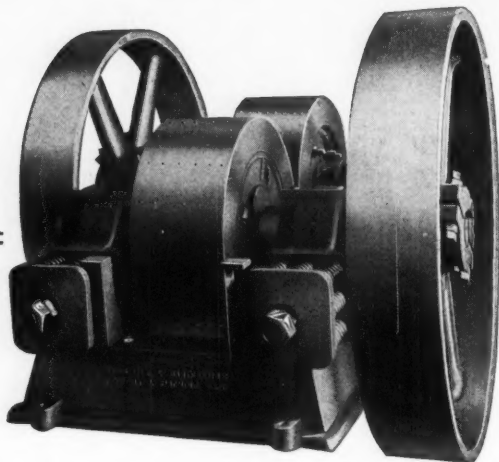
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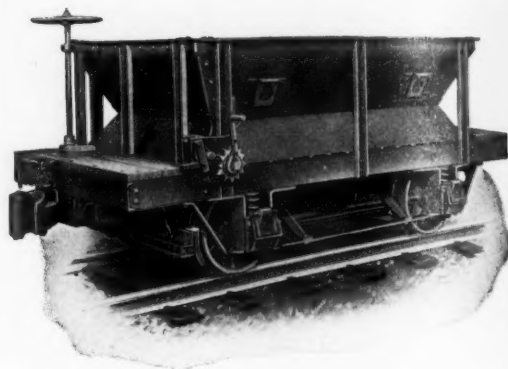
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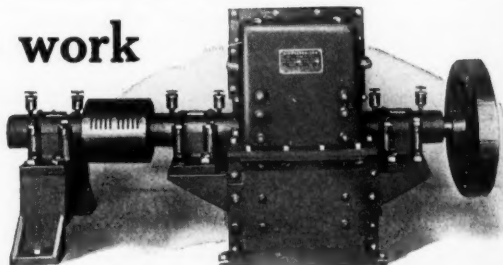
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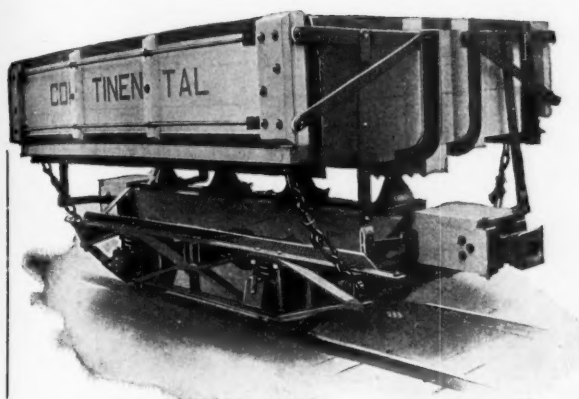
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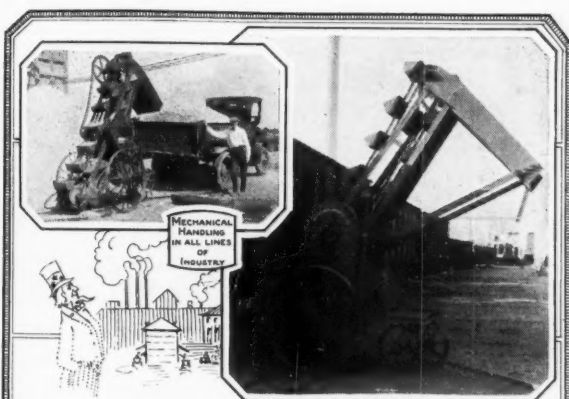
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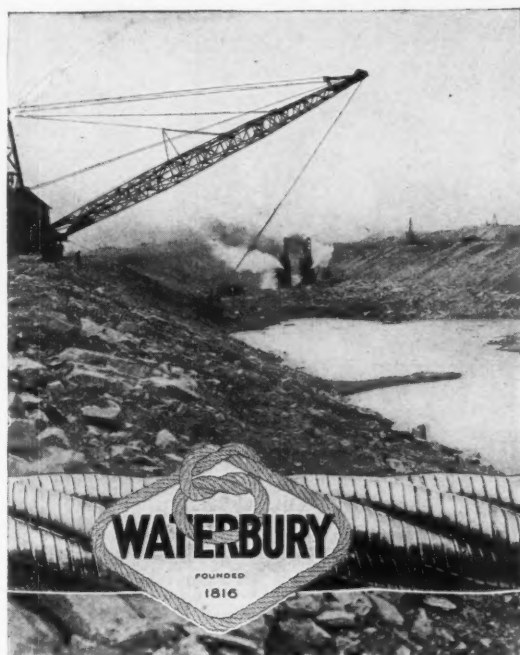
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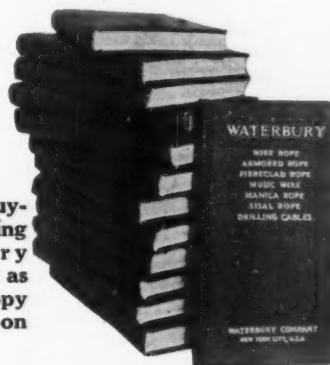
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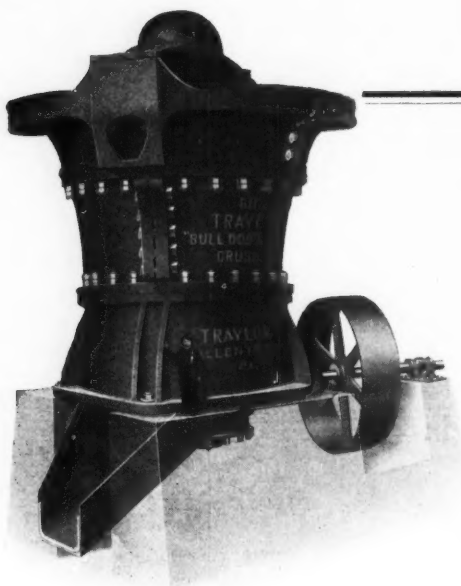
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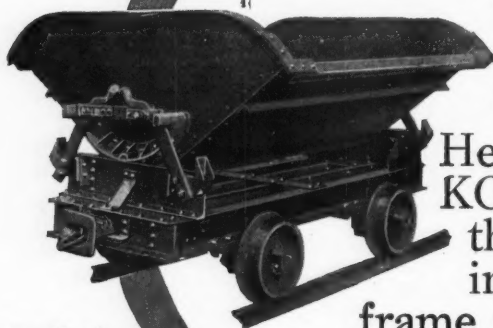
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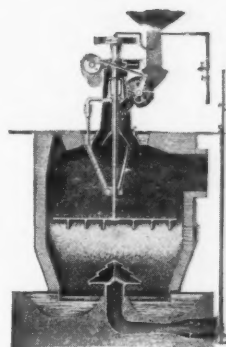

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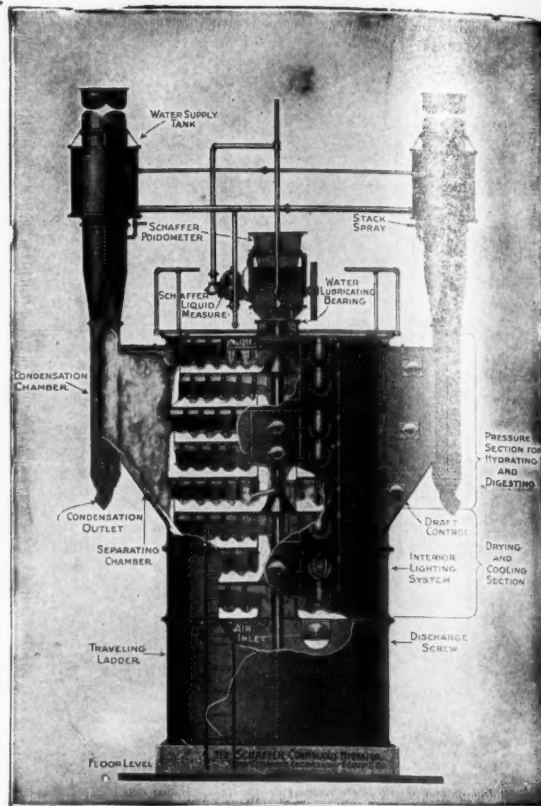
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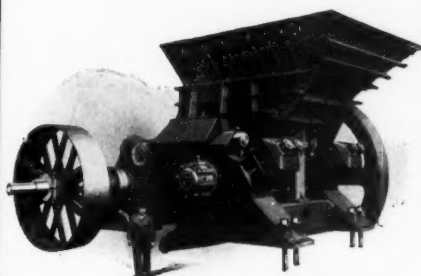
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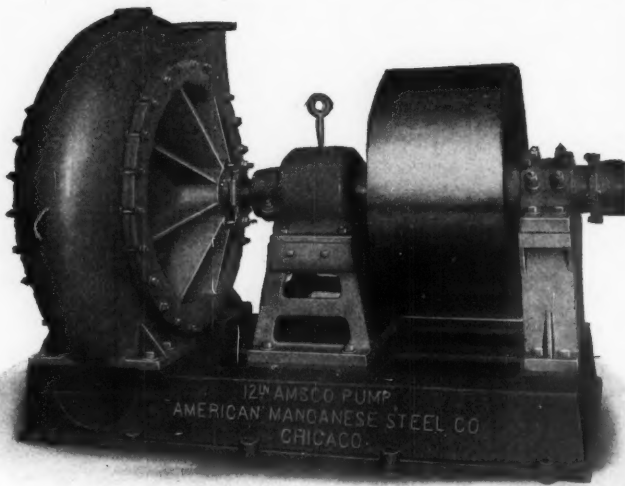
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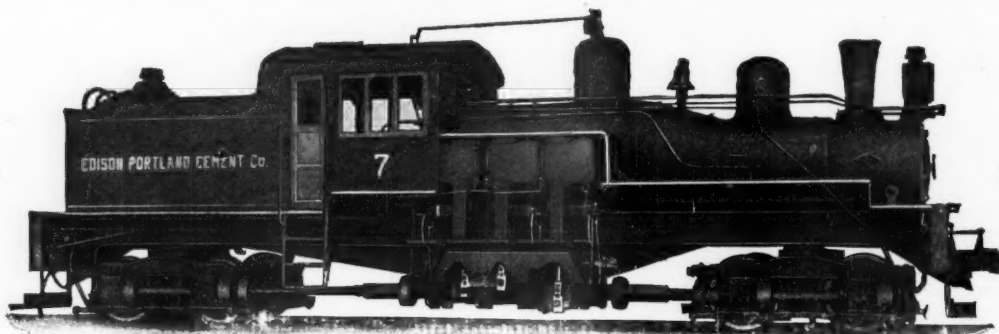
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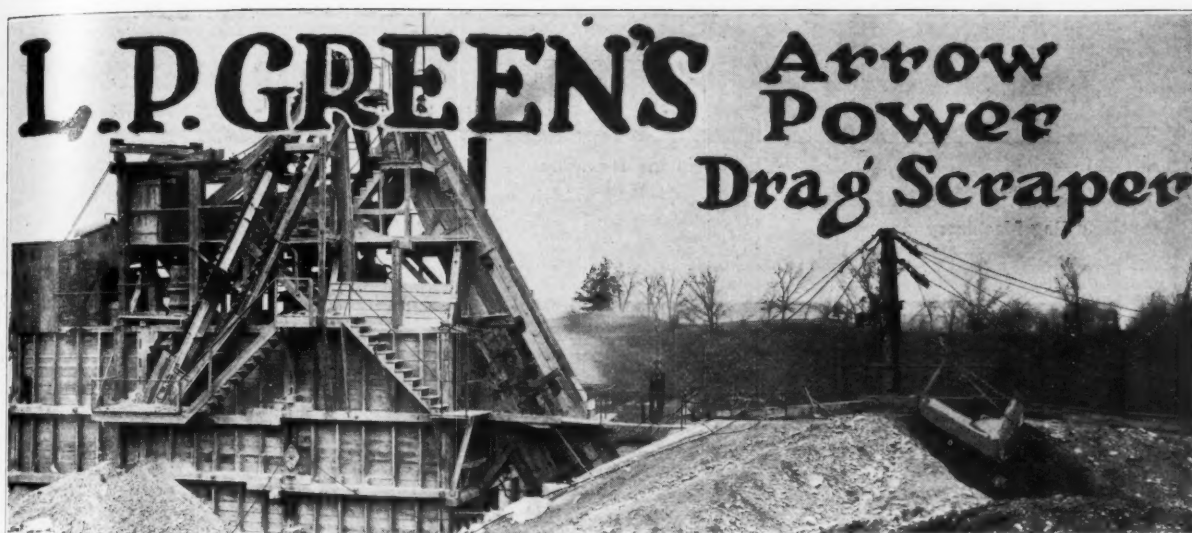
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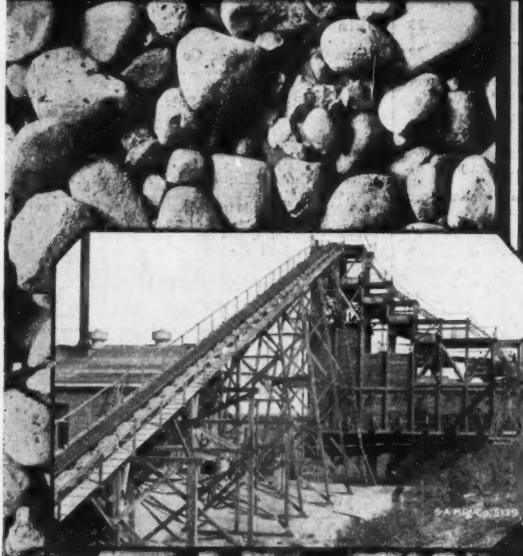
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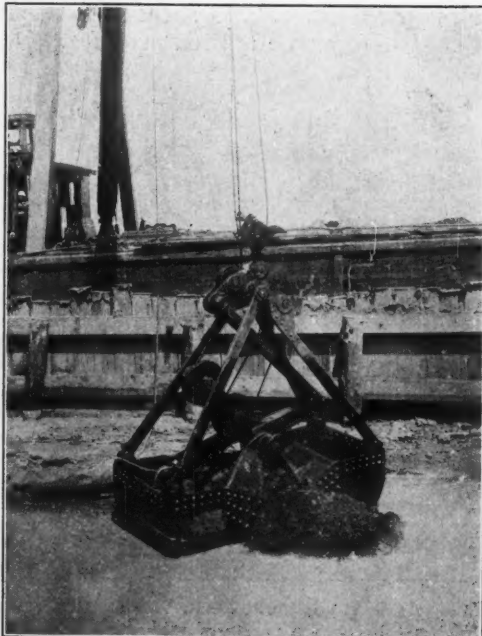
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